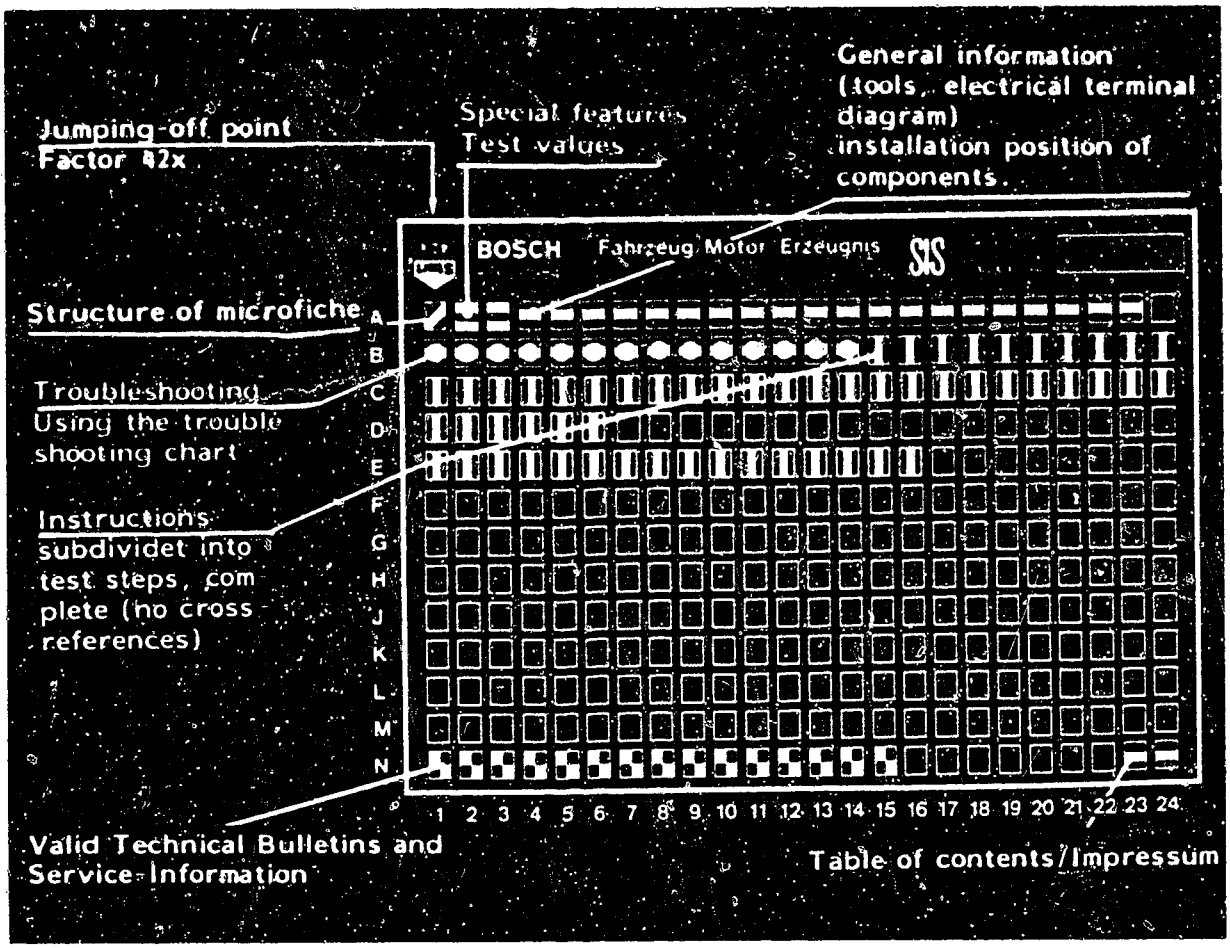
Structure of microfiche



1. Read from left to right
2. Title of microfiche (appears on each coordinate)

E16	Product/component/test step Vehicle/engine

Coordinate

3. Limits of section

Beginning | Mid-section | End | One-page section

4. References to relevant test steps in test specifications; coordinate e.g. C6

1. Special features

Vehicles with:	Control unit	0 227 100 124 (with current limiter)
	Ignition coil	0 221 122 334
	Anti-knock control unit	0 261 201 004
	Knock sensor	0 261 231 001

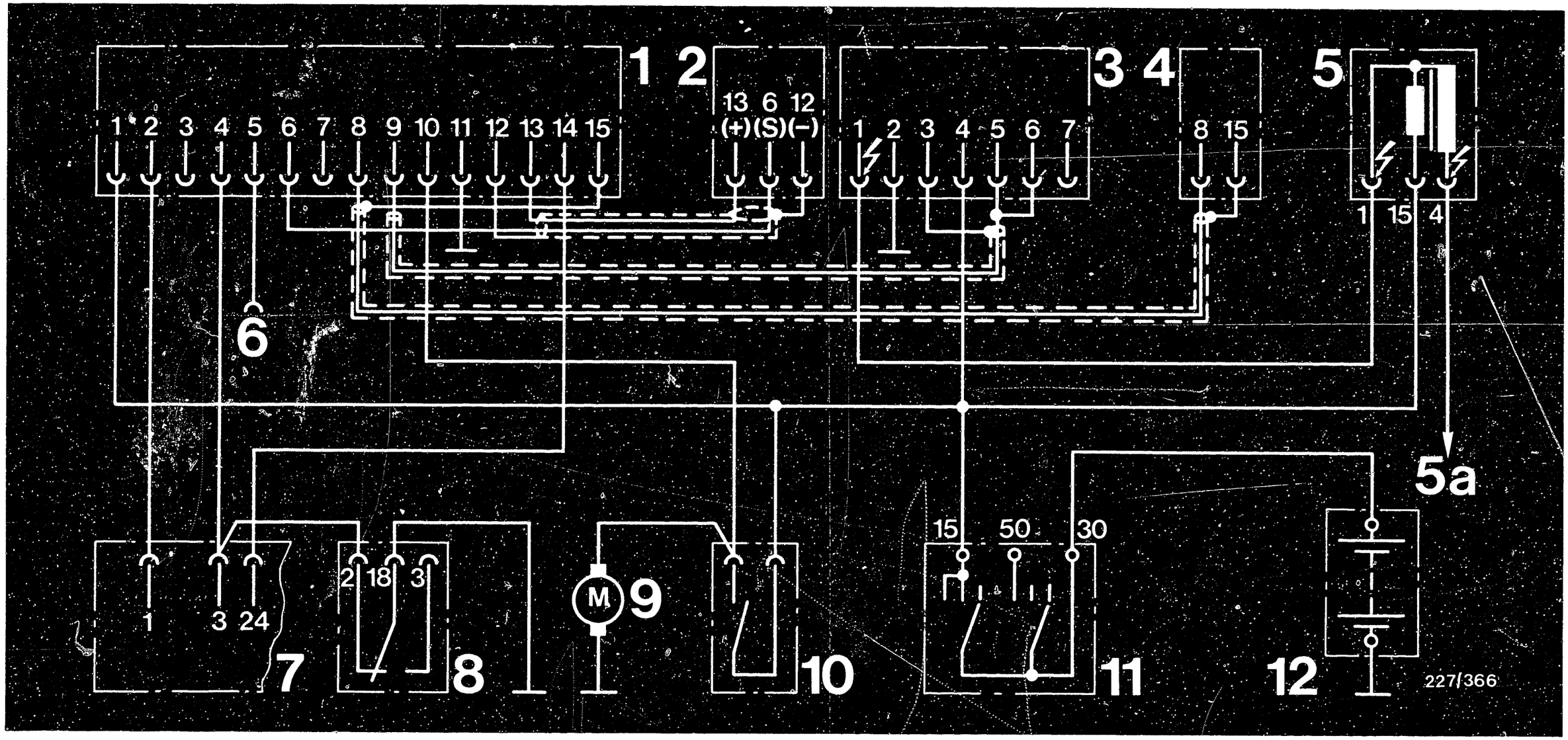
2. Test values

Dwell angle at starting speed	27 ... 33%	B21
Ignition coil primary	0.6...1.0 Ω	B17
Ignition coil secondary	6.4...11.1 kΩ	
Basic ignition setting	12 ±1° before TDC	C7
at idle	700...800 min^{-1}	
Anti-boilover switch	> approx. 103°C, approx. 0 Ω	C9
	< approx. 103°C, approx. ∞ Ω	
Timing angle at idle (Anti-boilover switch bridged)	23...27° before TDC	C13
Voltage to anti-knock control unit	≧ 10.5V	C15
Knock sensor	270...330 kΩ	C21
Knock sensor tightening torque	11 ... 15 Nm	

Test values (cont'd.)

Voltage to control unit	12 ... 14 V	D3
Voltage to ignition coil	≧ 10 V	
Primary voltage at idle	295 ... 365 V	D5
Voltage to magnetic pulse generator with ignition on	≧ 9 V	E7

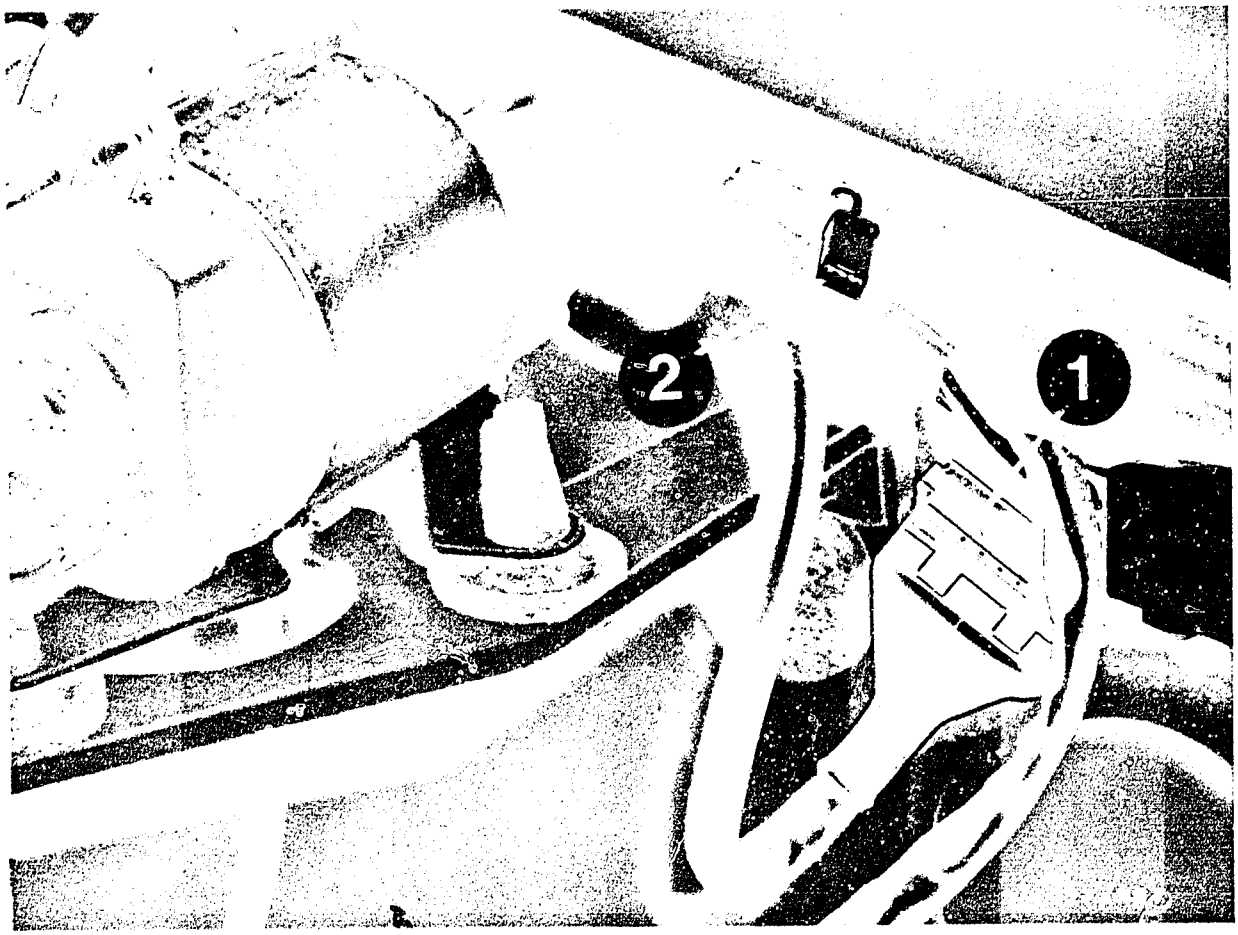
See auto data test values for setting values for timing, idle speed, exhaust, valve clearance, etc.



= high voltage (400 V - 25 kV)

1 = Anti-knock control unit
2 = Ignition distributor (magnetic pulse generator)
3 = Control unit
4 = Knock sensor
5 = Ignition coil
5a = To ignition distributor
6 = Diagnostic connector
7 = LH-Jetronic control unit
8 = Throttle valve switch
9 = Fan motor
10 = Anti-boilover switch
11 = Ignition/starter switch
12 = Battery

3. Wiring diagram



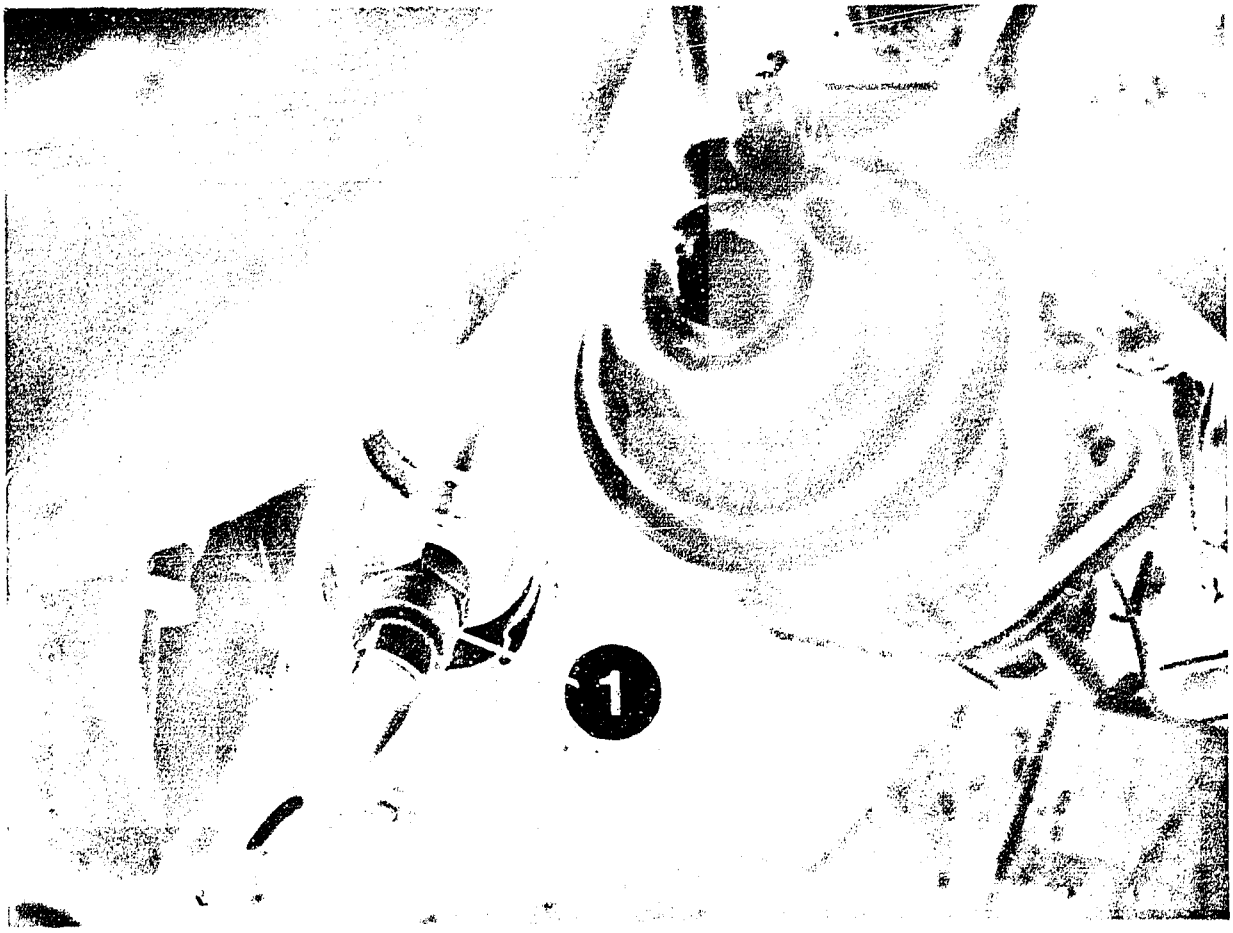
1 = Control unit

2 = Diagnostic connector

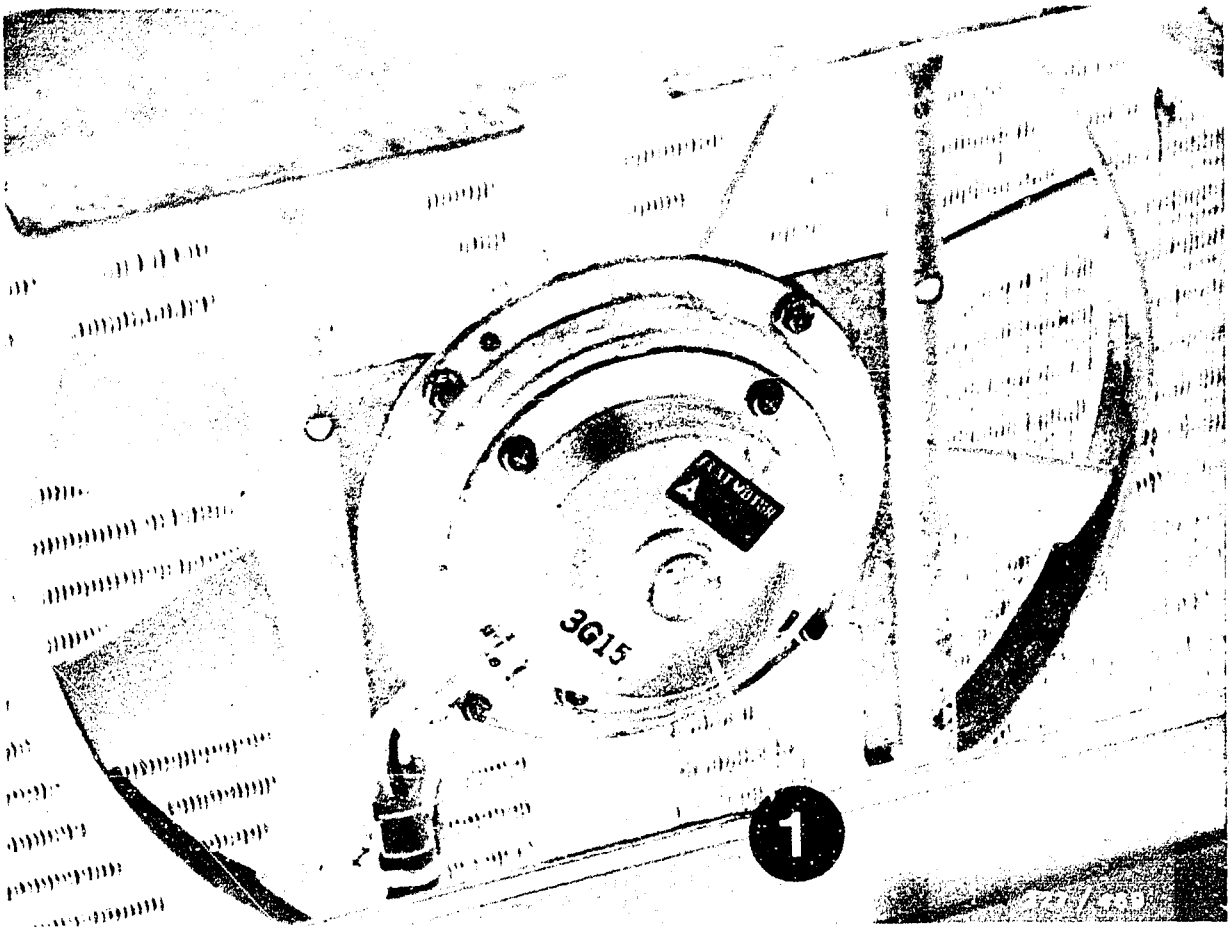
4. Component locations

The control unit is mounted on a heat sink inside the engine compartment (near left-hand wheel well).

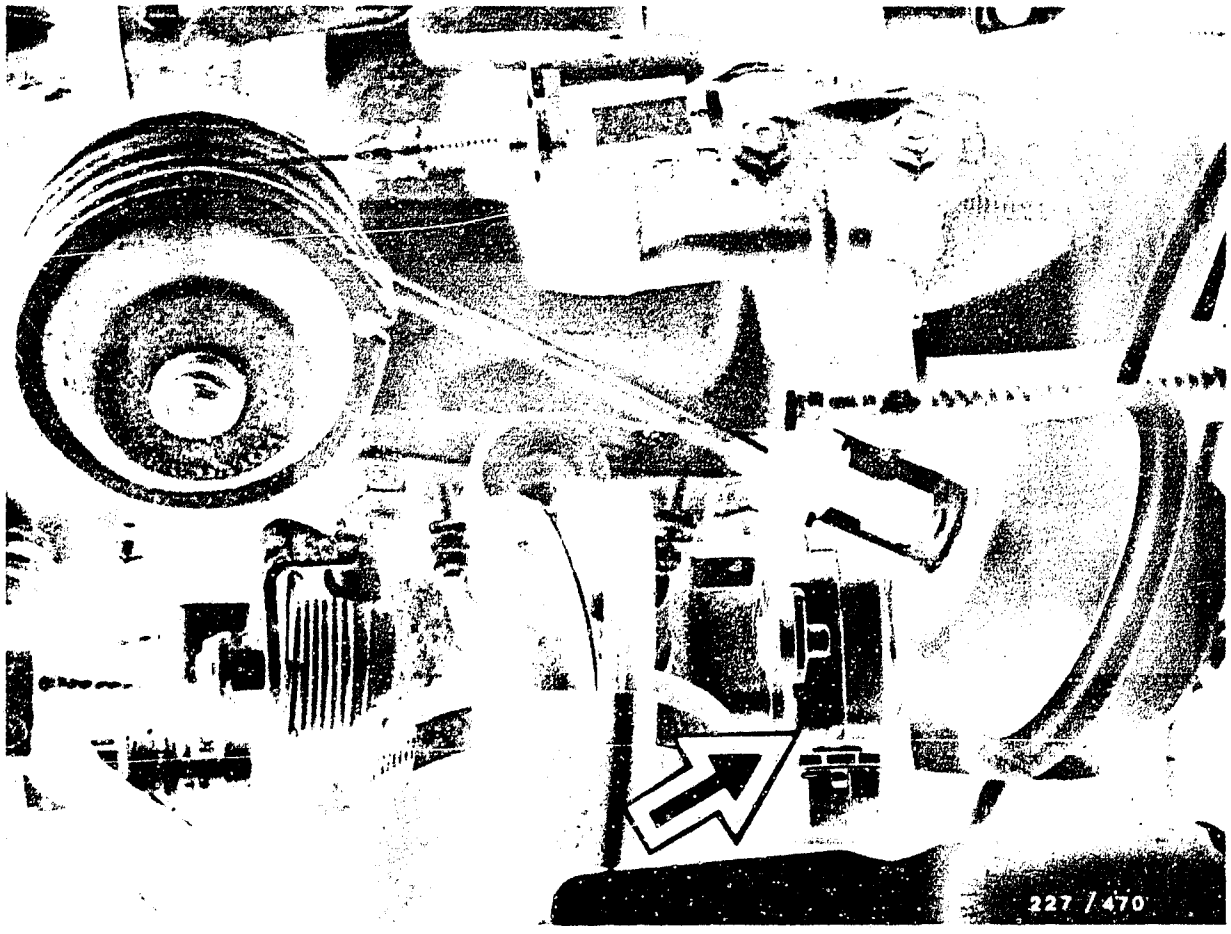
The diagnostic connector is located on the wiring harness.



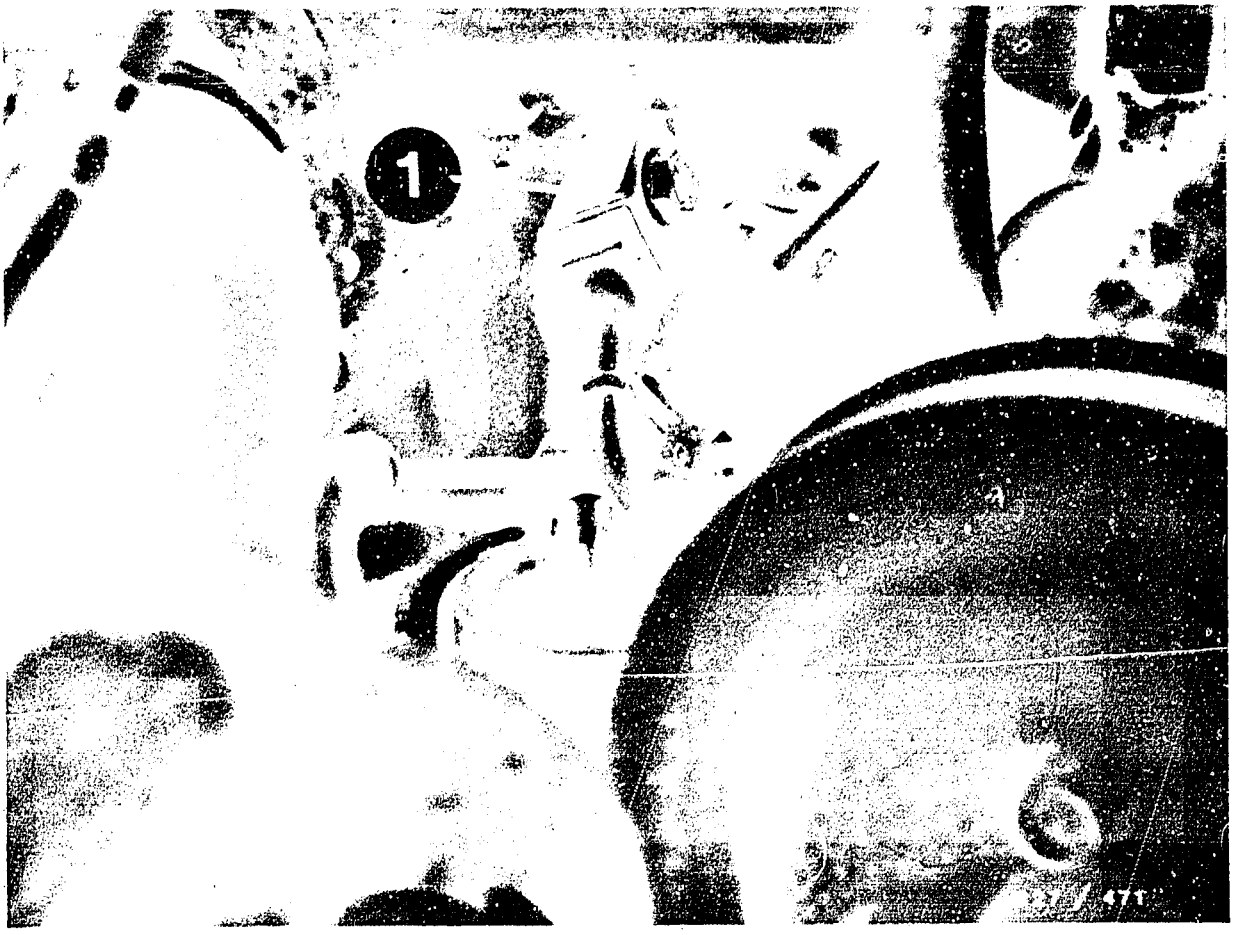
1 = Anti-boilover switch



1 = Fan motor (anti-boilover protection)



Throttle valve switch



1 = Knock sensor

The knock sensor is located on the upper part of the engine block (driver's side).

Note:

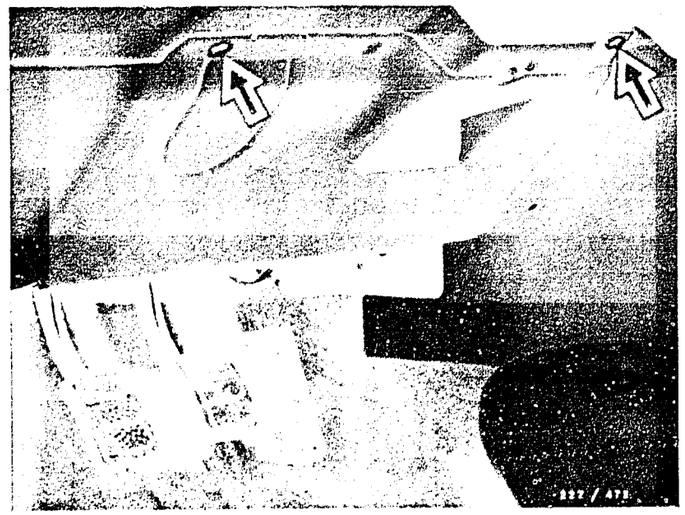
See above for correct position of knock sensor (connection on side).

Attach mounting bolt of knock sensor w i t h o u t plain washer, spring lock washer, tooth lock washer, etc.

Tightening torque 11 ... 15 Nm

Secure mounting bolt only with locking paint.

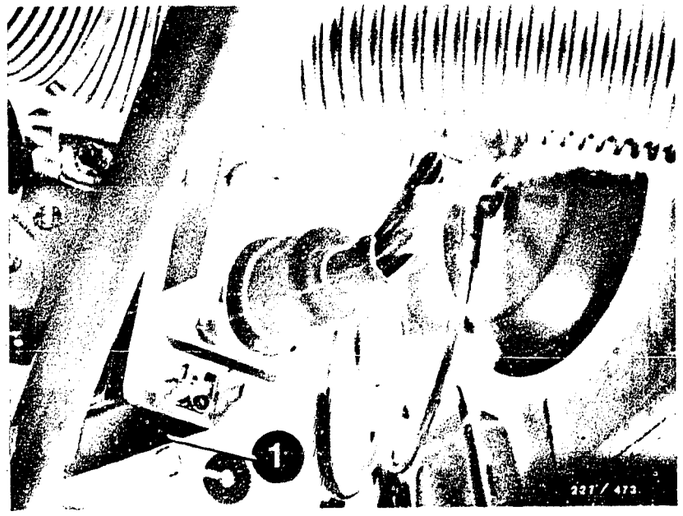
The anti-knock control unit is located inside the cabin at the left near the pedal mechanisms. See photograph below.



Removal instructions:

Remove steering column cover panel. See arrow in photograph above.

1 = Anti-knock control unit

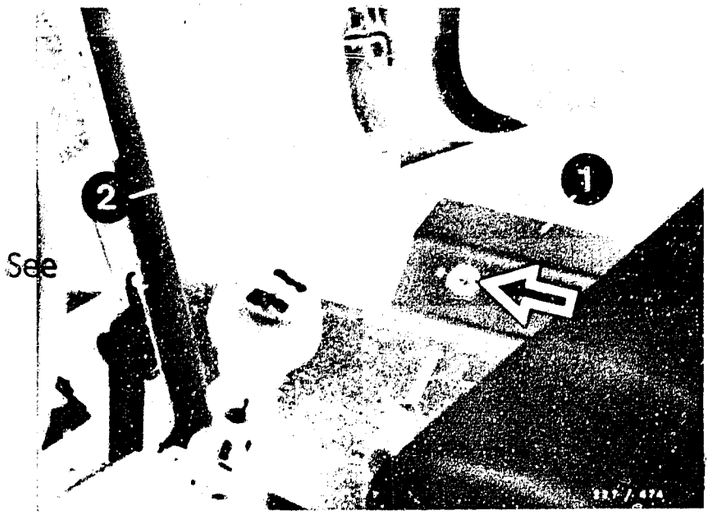


The LH-Jetronic control unit is located inside the cabin at the right (below the glove compartment). See photograph below.

Removal instructions:

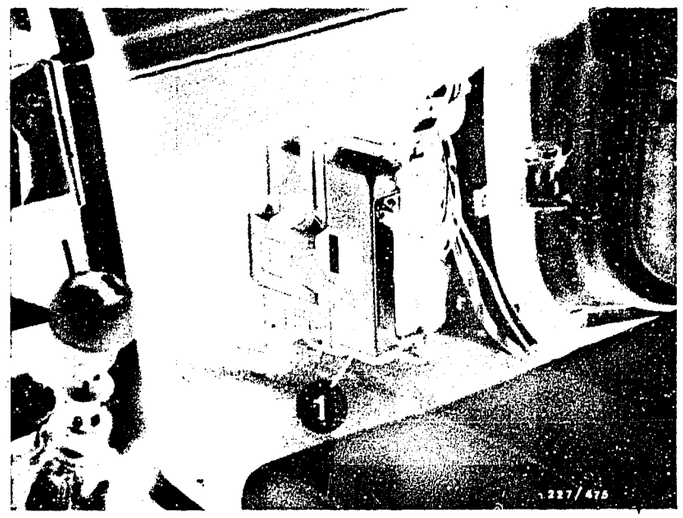
Remove mounting screws from door threshold molding and LH-Jetronic control unit cover. See arrow in photograph above.

Remove cover and molding. See photograph above.



1 = Door threshold molding
2 = LH-Jetronic control unit cover

1 = LH-Jetronic control unit



5. Required test instruments and tools

Engine tester, e.g.	MOT 201	0 684 000 201
Spark discharge tester, e.g. Ignition coil condenser tester	EFAW 106 A	0 681 100 001
or Single spark discharge tester	EF 1177 / 7	1 684 531 000
5 kΩ sleeve-type suppressor		0 356 500 001
Ohmmeter	ETE 014.00	0 684 101 400
or	Pontavi WH 2	commercially available
Voltmeter, e.g.	ETE 014.00	0 684 101 400
Analog voltmeter (multimeter) for determining self-diagnosis voltage pulses		commercially available
Test leads (for proper attachment of test equipment to connectors)		KDZS 0004
Test prods (for proper attachment of test equipment to connectors)		commercially available
Thermal conduction paste		5 942 860 003
Bolt locking paint, 30 g		5 703 245 003
Torque wrench Range: 5 ... 60 Nm		commercially available
Auxiliary lead for user fabrication (e.g. to check anti-boilover function) Parts required:		
approx. 90 mm of 1.5 mm² cable		6 210 ...
2 flat pin terminals		8 784 480 011

6. Incorrect speed, dwell angle and firing point display

Incorrect indication of speed, dwell angle and firing point by test equipment may occur in ignition systems with control unit 0 227 100 124 (TZ-I) incorporating current limitation.

See coordinates N 10 - N 14 for additional information.

7. Hazards in electronic ignition systems

Increased demands placed on ignition systems by modern engines, as well as the desire for reduced maintenance, caused electronic ignition systems to be introduced as standard equipment some time ago.

As a rule, the power supplied by nearly all electronic ignition systems exceeds that of conventional systems, and further increases are expected. Thus electronic ignition systems are within a power range where contact with live parts or terminals can be extremely hazardous (on both the primary and secondary sides).

We therefore recommend that any work or tests performed on the ignition system be in accordance with VDE Regulations (Association of German Electrical Engineers), particularly VDE 0104 dated July, 1967, as well as all pertinent national regulations.

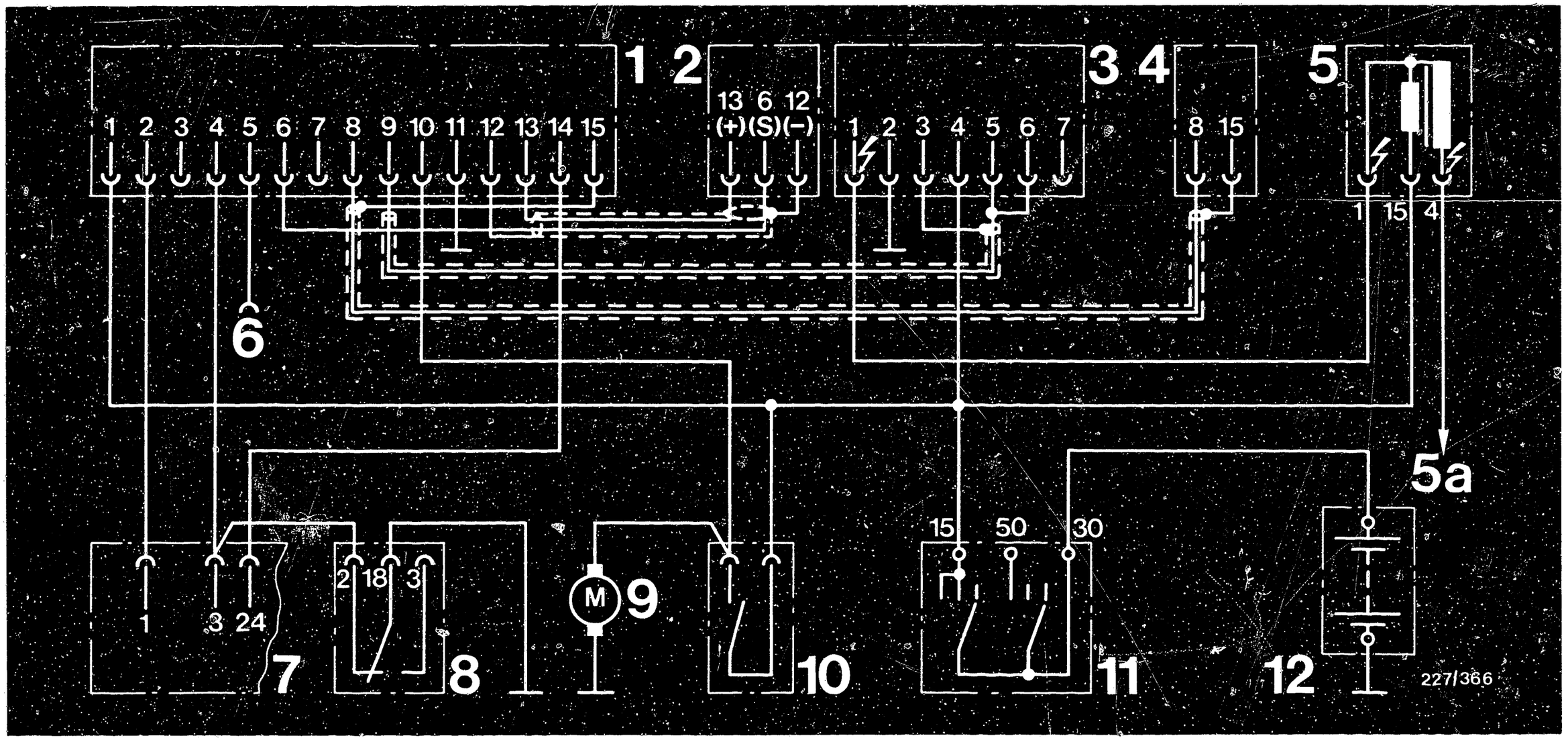
The ignition must always be switched off when work is performed on the ignition system (switch off ignition and/or power supply).

This work includes:

- attaching engine testers (timing light, dwell-tach tester, ignition oscilloscope, etc.)
- replacing ignition system parts (spark plug, ignition coil, ignition distributor, ignition cable, etc.)

Should testing of the ignition system or adjustments to the engine (e.g. LH-Jetronic) require the ignition to be switched on (switch on ignition or power supply), the high voltages mentioned above will be present throughout the entire system.

Hazards therefore exist not only within the individual subassemblies of the ignition system (e.g. ignition distributor, ignition coil, control unit, ignition harness), but also at the wiring harness (e.g. tachometer connector, diagnostic connector), plug connection cables and test equipment.



⚡ = high voltage (400 V - 25 kV)

1 = Anti-knock control unit
2 = Ignition distributor (magnetic pulse generator)
3 = Control unit
4 = Knock sensor
5 = Ignition coil
5a= To ignition distributor
6 = Diagnostic connector
7 = LH-Jetronic control unit
8 = Throttle valve switch
9 = Fan motor
10 = Anti-boilover switch
11 = Ignition/starter switch
12 = Battery

Using the wiring diagram of an electronic ignition system as an example, hazardous points are marked with high-voltage arrows.

8. Important vehicle information

- Conduct resistance measurements only with ignition switched off or battery disconnected (tester defective)

- During compression testing remove control unit plug, or using an auxiliary cable securely connect ignition coil terminal 4 to ground (dangerously high voltage, insulation damage on ignition coil, ignition distributor, ignition harness).

  Note:
  Auxiliary cable must have at least 2 kΩ suppression, e.g. 5 kΩ sleeve-type suppressor 0 356 500 001.

- Do not replace specified ignition coil (see part No.) with a different type of ignition coil.

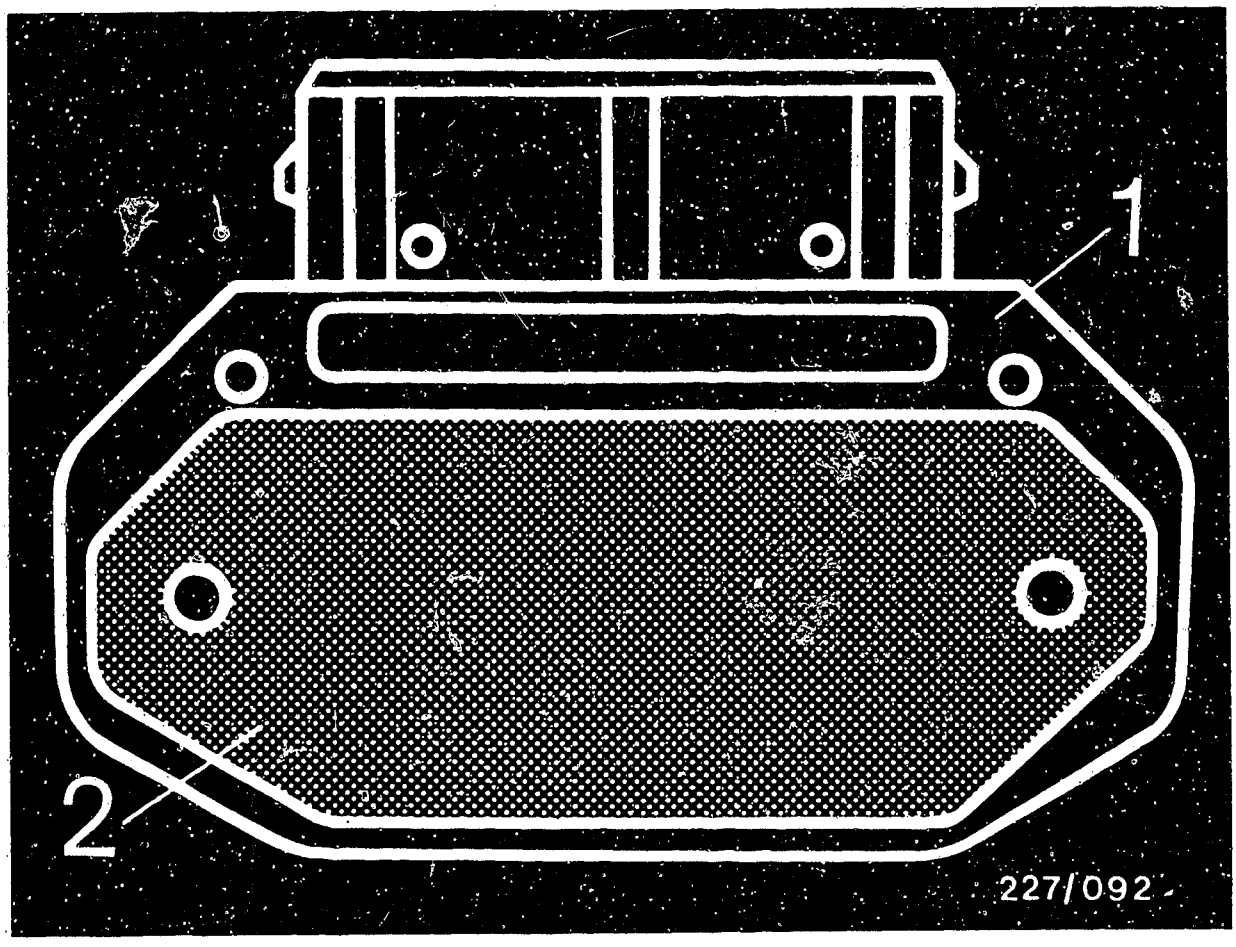
- Do not connect a suppression capacitor to ignition coil terminal 1.

- Do not connect ignition coil terminal 1 to ground as an anti-theft measure (when ignition is switched "on" ignition coil will be destroyed).

- Do not connect a positive battery terminal or test lamp to ignition coil terminal 1 (control unit will be destroyed).

- Do not remove the high voltage ignition cable between ignition coil terminal 4 and ignition distributor terminal 4 with the engine running.

- Flashover from ignition coil terminal 4 to ignition coil terminals 1 and 15 must be prevented. The magnetic pulse generator and control unit could be destroyed.



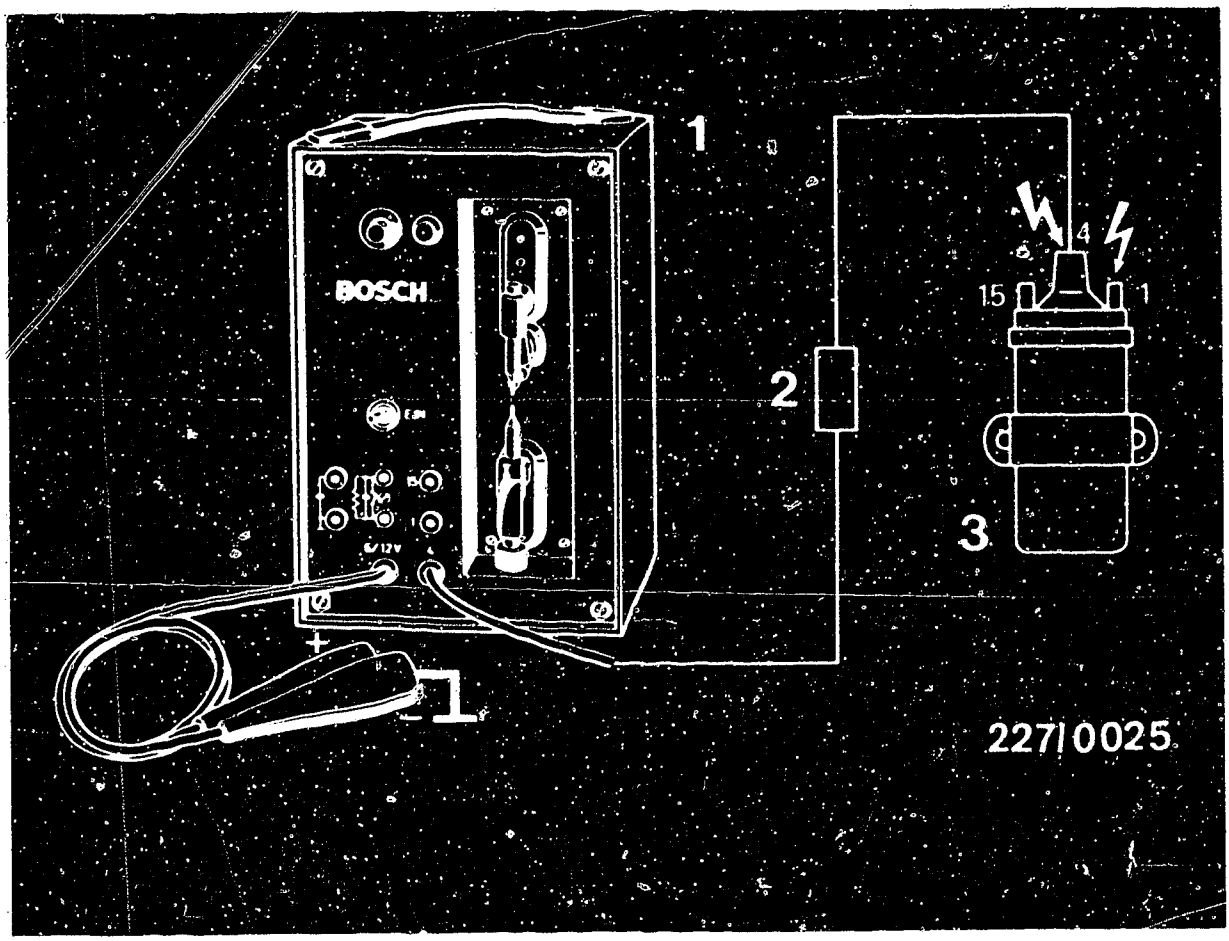
1 = Control unit

2 = Baseplate

- Coat baseplate with thermal conduction paste before mounting control unit.

  Use only suitable object (screwdriver, match, etc.) to apply paste.

  Keep thermal conduction paste off painted parts.



1 = Spark discharge tester
2 = 5 kΩ sleeve-type suppressor
3 = Ignition coil

= High voltage (400 V - 25 kV)

- To prevent damage to the control unit when using a spark discharge tester, a suppression resistor of at least 2 kΩ must be connected between the spark discharge tester and ignition coil terminal 4 (e.g. 5 kΩ sleeve-type suppressor 0 356 500 001) to prevent damage to the control unit.

prevent damage to the control unit, a suppression resistance of at least 2 kΩ must be connected to the secondary side of the ignition system. The original distributor rotor must be installed with a 1 kΩ suppression resistor (also do not use a 5 kΩ distributor rotor for radio interference suppression).

- Do not attach any external voltage source such as an ohmmeter to the magnetic pulse generator (hall generator). Use caution when switching meter ranges.

- Leads running from the magnetic pulse generator to the anti-knock control unit or from the anti-knock control unit to the control unit must be shielded (to prevent disruption of anti-knock control unit or control unit operation).

- Do not allow the ignition distributor cap holding springs to fall into the generator system while cranking the engine with the dust protection cover removed.

- Flashover or punchthrough at ignition distributor cap (poor insulation) may destroy the magnetic pulse generator and the control unit.

- Do not disconnect battery terminals with engine running.

- Do not assist starting at more than 16 volts or with a fast charger.

- Reversed battery polarity will destroy the magnetic pulse generator, control unit, ignition coil and anti-knock control unit.

- Knock sensor cable must be shielded and routed separate from high voltage cables.

- Attach mounting bolt of knock sensor w i t h o u t plain washer, spring lock washer, tooth lock washer, etc. Secure mounting bolt only with locking paint.

9. Troubleshooting

9.1 Using the self-diagnosis system and the self-diagnosis test chart

This vehicle has a built-in anti-knock control unit which contains a self-diagnosis system (only for knock regulation).
Therefore every test conducted with the engine running must begin with the self-diagnosis system.
Coordinates B5/B6 describe how to activate the system.
The self-diagnosis test chart which begins at coordinates B7/B8 identifies trouble indicators (in the form of voltage pulses), causes of trouble and test procedures, and gives the coordinates for more specific troubleshooting.
If the self-diagnosis system indicates no trouble but the cause of the customer's complaint has not been eliminated, continue the troubleshooting procedure in accordance with the trouble-shooting chart and the troubleshooting sequence beginning at coordinate B 9.

9.2 Using the troubleshooting chart

The troubleshooting chart beginning at coordinate B9 lists customer complaints (symptoms), causes of trouble, test procedures and reference coordinates.
Select the possible cause of the trouble which corresponds to the customer's complaint as indicated in the troubleshooting chart.

If the cause of the trouble is unclear, begin testing using the extensive, self-contained troubleshooting sequence beginning at coordinate B 15.

If the cause of the trouble can be clearly determined according to the troubleshooting chart, the problem can be pinpointed using the given coordinates without having to go through the entire troubleshooting sequence for each problem.
If no coordinates are given, proceed with troubleshooting using the "test steps" column.

9.3 Using the troubleshooting sequence

The troubleshooting sequence beginning at coordinate B 15 is divided into 3 columns:

The left-hand column gives test steps and test values.

The center column gives instructions for repair.

The right-hand column contains the corresponding figures and wiring diagrams and indicates their locations.

If the questions given in the left-hand column can be answered "yes", go on to the next test directly below.

If a question is answered "no", move over to the center column and conduct the tests listed there.

9.4 Testing requirements

Battery fully charged, fuel system OK, engine in good working order (compression, valve clearance, etc.), ambient temperature or temperature of ignition system between 0 and 100°C (temperature has pronounced effect on measurements).

9.5 Activating the self-diagnosis system

Test requirement: engine speed of at least 3,500 min^{-1}

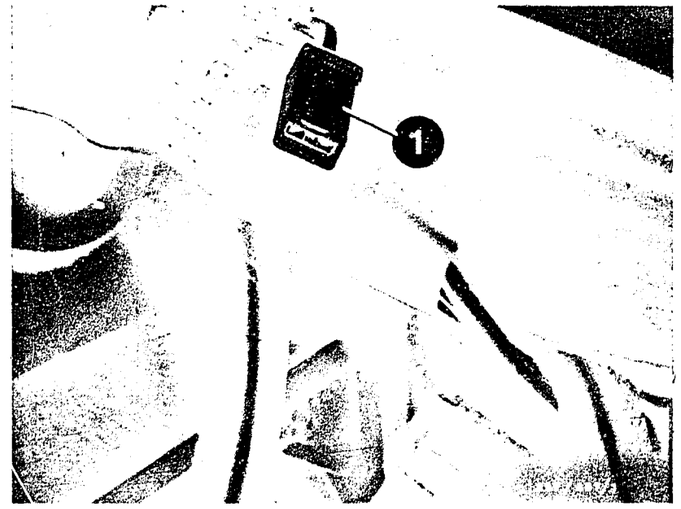
General

Anti-knock control unit 0 261 201 004 has a self-diagnosis system with a diagnostic connector located in the engine compartment. See photograph.
The self-diagnosis system only indicates one fault at a time. The first fault must be elminiated before any subsequent faults can be indicated.
A total of 4 different faults (only for knock regulation) in the form of voltage pulses can be determined. The voltage pulses are displayed on an ANALOG VOLTMETER (with pointer) as pointer deflections.
The person conducting the test counts the voltage pulses (pointer deflections indicated on the voltmeter).

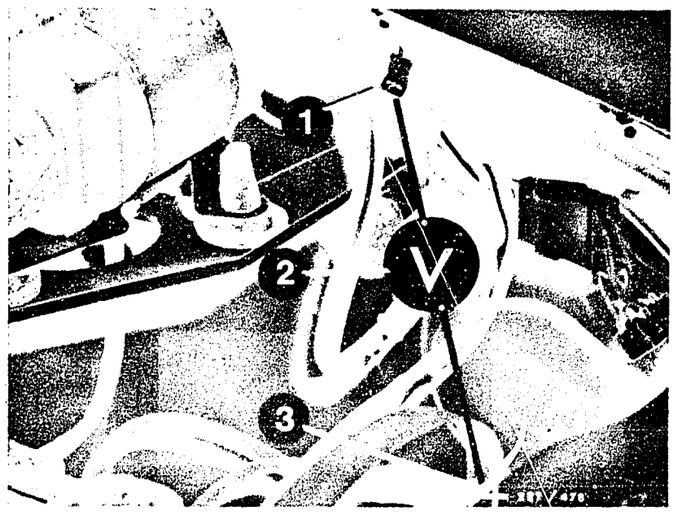
Voltmeters with a digital display cannot be used!

Activating the system

Connect voltmeter to positive battery terminal and diagnostic connector. See photograph.
Switch on ignition.
The voltmeter must indicate the approximate battery voltage. If no battery voltage is indicated, follow test steps at coordinates C 1/C 2. Then continue activation procedure in accordance with coordinates B 5/B 6.
Start the engine, run up to at least 3,500 min^{-1} and then run at idle.
Depending on the fault involved, the voltmeter will now show 2 to 5 voltage pulses. By referring to the self-diagnosis test chart (coordinates B 7/B 8), the faults can be evaluated and eliminated.
Note: A pause follows each diagnostic sequence (voltmeter pointer remains at "zero").
The diagnostic sequence, including pauses, is repeated until the ignition is switched off, thus clearing the fault indication stored in the anti-knock control unit.
Self-diagnosis activation followed by elimination of the fault must be repeated until no voltage pulses are indicated (knock regulation is then OK).



1 = Diagnostic connector



1 = Diagnostic connector
2 = Analog voltmeter
3 = Positive battery terminal

Self-diagnosis test chart

Trouble indication	Cause of trouble	Test steps	Coordinates
No voltage pulse	Anti-knock control unit OK	-----	----------
2 voltage pulses	Supply voltage from knock regulator 10.5 V	Check for voltage drop and eliminate	C 15
3 voltage pulses	Anti-knock control unit (evaluation circuit) not OK	Replace anti-knock control unit	----------
4 voltage pulses	Anti-knock control unit not OK	Check knock sensor (sensor mounting, opens and shorts)	C 19
5 voltage pulses	Load signal (LH-Jetronic) not OK	Check load signal	C 23

9.6 Troubleshooting chart

Customer complaint (symptom)

1. Starter engages, engine does not start
2. Rough idle
3. Engine gets no gas (flow problem)
4. Poor engine performance
5. Engine misfires
6. Fuel consumption too high
7. Engine pings or knocks
8. Faulty ignition
9. Engine runs too hot

1	2	3	4	5	6	7	8	9	Cause of trouble	Test steps	Coordinates
●	●	●	●	●	●	●	●	●	Unclear	Perform thorough troubleshooting	B 15
●	●	●	●	●	●		●		Spark plugs defective	Evaluate ignition oscilloscope trace or remove and visually check spark plug	----
		●	●	●	●				Suppression resistors defective	Evaluate oscilloscope trace or measure resistance	----
●	●	●	●	●					Shunt on secondary side	Check ignition coil, ignition distributor, ignition harness and spark plug by means of oscilloscope trace or visual check	----
●	●	●	●	●					Open circuit on secondary side	Check ignition coil, ignition distributor, ignition harness and spark plug by means of oscilloscope trace or check continuity using ohmmeter	----
●									Open circuit on primary side	---	E 1
●	●	●	●	●					Ignition coil defective	---	B 17

Troubleshooting chart

Customer complaint (symptom)

1. Starter engages, engine does not start
2. Rough idle
3. Engine gets no gas (flow problem)
4. Poor engine performance
5. Engine misfires
6. Fuel consumption too high
7. Engine pings or knocks
8. Faulty ignition
9. Engine runs too hot

1	2	3	4	5	6	7	8	9	Cause of trouble	Test steps	Coordinates
●	●						●		Firing sequence incorrect	Firing sequence 1 - 3 - 4 - 2	----
	●								Throttle valve switch idle contact defective	----	C 3
●	●	●	●	●	●	●		●	Ignition timing adjust-ment incorrect	----	C 7
								●	Anti-boilover switch defective	----	C 9
								●	Fan motor defective	----	C 11
								●	Anti-boilover function not operating	----	C 13
●			●		●				Power supply from anti-knock control unit incorrect	----	C 15

Troubleshooting chart

Customer complaint (symptom)

1. Starter engages, engine does not start	2. Rough idle	3. Engine gets no gas (flow problem)	4. Poor engine performance	5. Engine misfires	6. Fuel consumption too high	7. Engine pings or knocks	8. Faulty ignition	9. Engine runs too hot	Cause of trouble	Test steps	Coordinates
			●		●				Knock sensor defective	---	C 19
		●	●		●				Load signal from LH-Jetronic incorrect	---	C 23
●									Power supply from control unit incorrect	---	E 1
●			●		●				Power supply from anti-knock control unit incorrect	---	E 3
●									Magnetic pulse generator defective	---	E 5
●									Anti-knock control unit incorrect	---	E 11
			●		●				Abnormal engine noise	Engine has mechanical problems (bearing damage, broken valve spring, etc.)	----
			●		●	●			Improper fuel	Fuel octane too low	----

9.7 Troubleshooting sequence

Check primary signal.

If oscilloscope or tachometer tester not available, check for ignition spark on spark discharge tester.

Primary signal with oscilloscope

Connect oscilloscope to ignition coil as per operating instructions. Start engine. Oscilloscope must indicate primary voltage (magnitude not important).

Primary signal with tachometer tester

Connect tachometer tester to ignition coil as per operating instructions.
Start engine.
Tachometer tester must register a value (magnitude not important).

Ignition spark with spark discharge tester

Remove high tension ignition cable at terminal 4 of ignition coil.
Connect spark discharge tester with sleeve-type suppressor (5 kΩ) to ignition coil.
Set spark gap to 5 mm.
Start engine.
Sparks must appear across spark gap.

Are primary signal and/or ignition sparks in spark gap present?

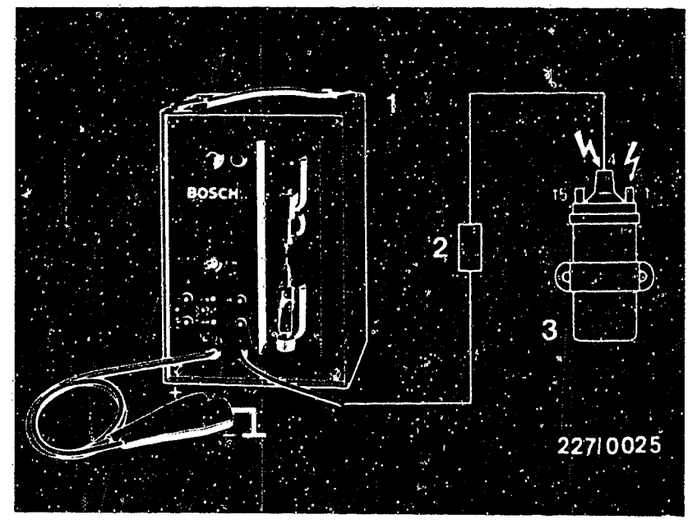
no →

If no primary signal or ignition spark is present, continue test at coordinate E 1.

Test beginning at B 17 not necessary.

yes ↓

Continued at B 17/B 18



1 = Spark discharge tester
2 = 5 kΩ sleeve-type suppressor
3 = Ignition coil

= high voltage

yes

Check distributor cap, distributor rotor, high tension ignition cables and spark plugs.

Is high voltage side OK?

no → Repair high voltage side.

yes

Check ignition coil.

Visual check:

Remove protective cap from ignition coil and check for presence of plug and any leakage of sealing compound.

Electrical check:

Ignition coil, primary (term. 15 and term. 1) 0.6 ... 1.0 Ω (allow for resistance of instrument lead and test prods).
Ignition coil, secondary (term. 1 and term. 4) 6.4 ... 11.4 kΩ.

Plug present and no sealing compound leakage?

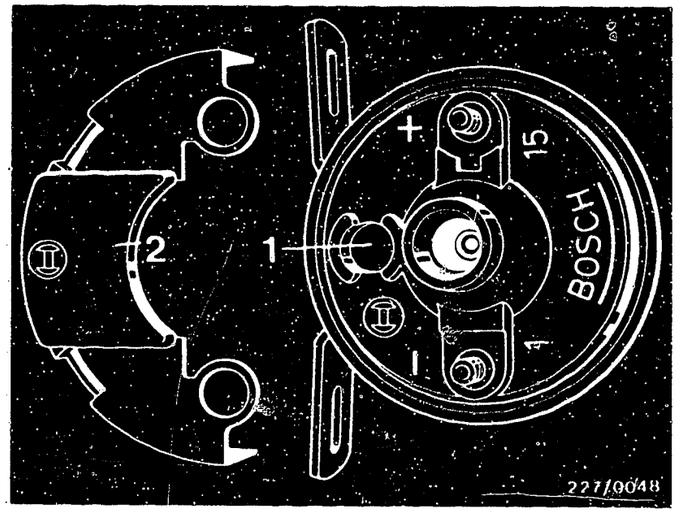
Is resistance value OK?

no →

1. If the plug is missing and sealing compound has leaked, replace control unit, anti-knock control unit and ignition coil.
2. If resistance values not OK, replace ignition coil.

yes

Continued at B 19/B 20



1 = Plug
2 = Protective cap

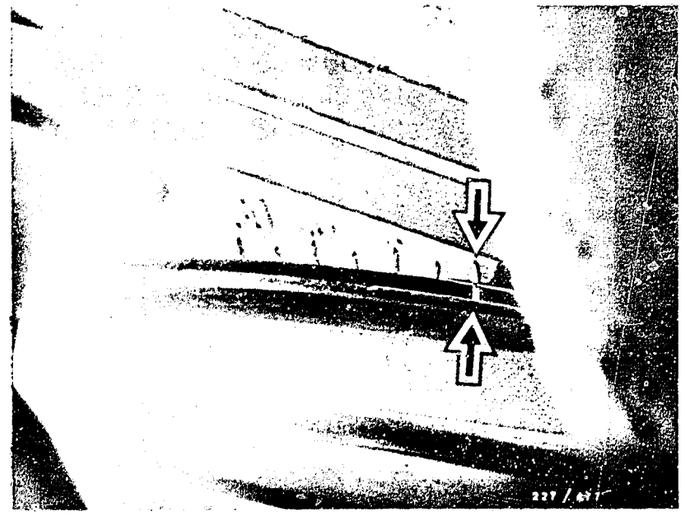
yes

Does engine run?

no

Step 1
Remove cap and dust cover from ignition distributor.
Set cylinder 1 to TDC.
See arrows in top photograph for markings.

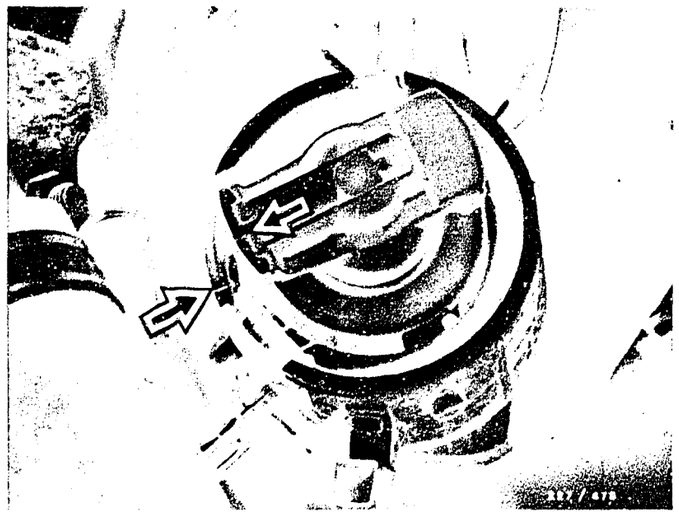
The distributor rotor must be set such that the center of the distributor rotor contact points toward the housing mark for cyl. 1.
See arrows in bottom photograph.
Set ignition distributor.



yes

Continued at C 1/C 2

Continued at B 21/B 22



Continued

Step 2

Disconnect positive and negative battery cables.
Remove control unit connector.
Switch on ignition.

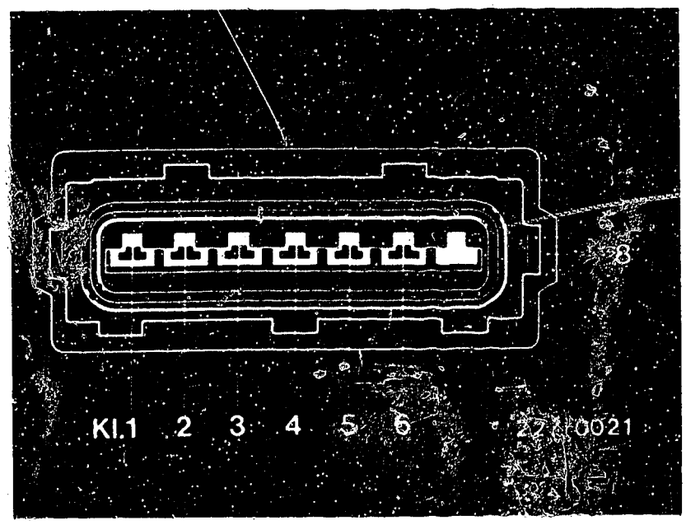
Check leads from positive battery terminal to control unit connector terminal 4 and from negative battery terminal to control unit connector terminal 2 for contact resistance.
Max. total contact resistance 0.3Ω (allow for resistance of test leads and test prods).
Eliminate contact resistance.

Check leads from positive battery terminal to ignition coil terminal 15 and the lead from ignition coil terminal 1 to control unit connector terminal 1 for contact resistance.
Max. total contact resistance 0.3Ω (allow for resistance of test leads and test prods).
Eliminate contact resistance.

Step 3

Reconnect battery. Attach dwell angle tester to ignition coil as per operating instructions.
Start engine. Dwell angle tester must indicate 27 ... 33% (only during starting). If dwell angle is incorrect, replace anti-knock control unit.

If steps 1, 2 and 3 were OK, replace control unit.



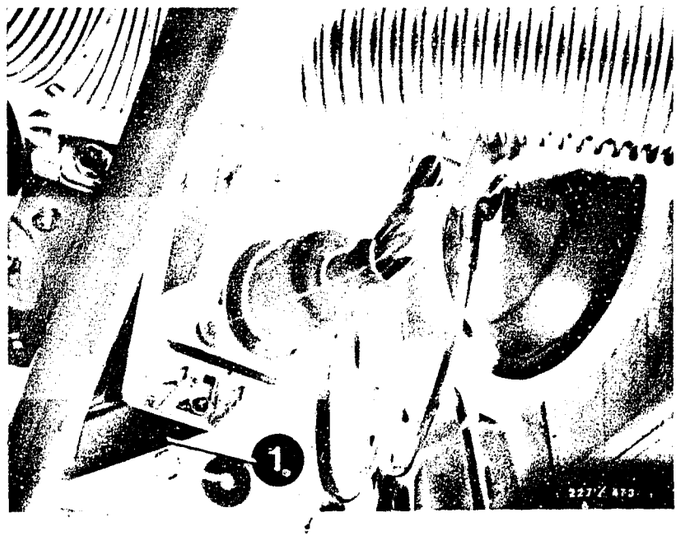
8 = Control unit connector

yes

Continued at C 1/C 2

Continued at B 23/B 24

1 = Anti-knock control unit



Continued

Step 4

Unplug LH-Jetronic control unit connector. See arrow in top photograph.

Set oscilloscope to "special" setting and attach as per operating instructions.

Example: MOT 201
Connect red clip with test prod to LH-Jetronic connector terminal 1 (test signal). See top photograph.

Connect black clip to vehicle ground.

Start engine.

Oscilloscope must display a square wave. See center illustration.

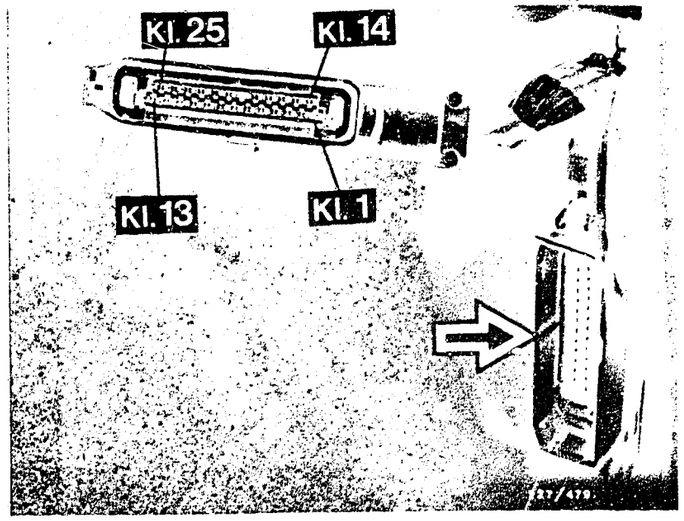
If square wave is not displayed, unplug anti-knock control unit connector. See bottom photograph.

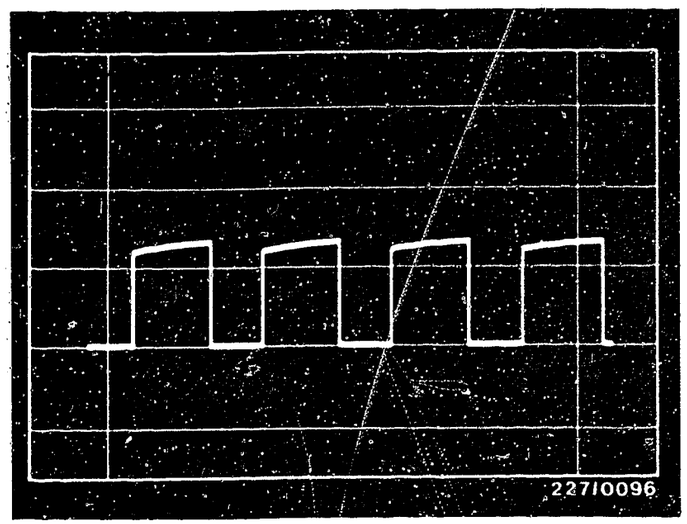
Check continuity of lead from anti-knock control unit connector terminal 2 to LH-Jetronic control unit connector terminal 1.

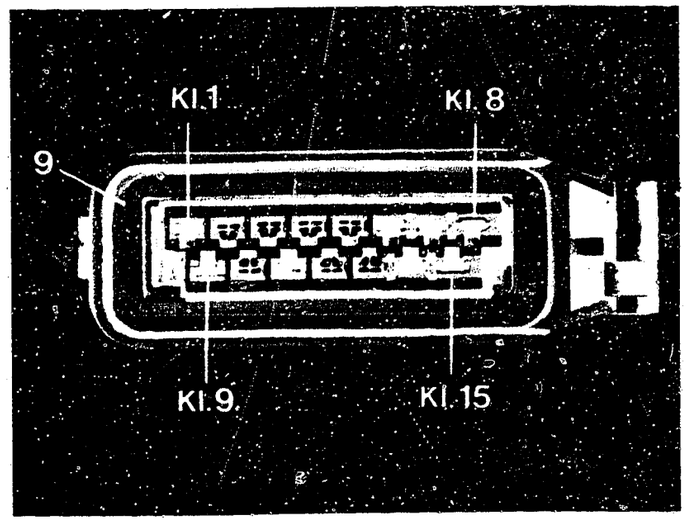
Eliminate discontinuity.

If no discontinuity is found, replace anti-knock control unit.

yes







Continued at C 1/C 2

yes

Check diagnostic connector

1. Connect analog voltmeter to positive battery terminal and diagnostic connector. See top photograph. Switch on ignition (do not start engine). Voltmeter must indicate approximate battery voltage.

2. Start engine and briefly run up to >1000 min^{-1}. Then run at idle. Voltmeter must now indicate 0 V or may show voltage pulses.

Is voltage under 1 and 2 above OK?

no

1. If no battery voltage was indicated at step 1, unplug anti-knock control unit connector (bottom photograph) and check continuity of lead from anti-knock control unit connector terminal 5 to the diagnostic connector.

Eliminate discontinuity.

If no discontinuity is found, replace anti-knock control unit.

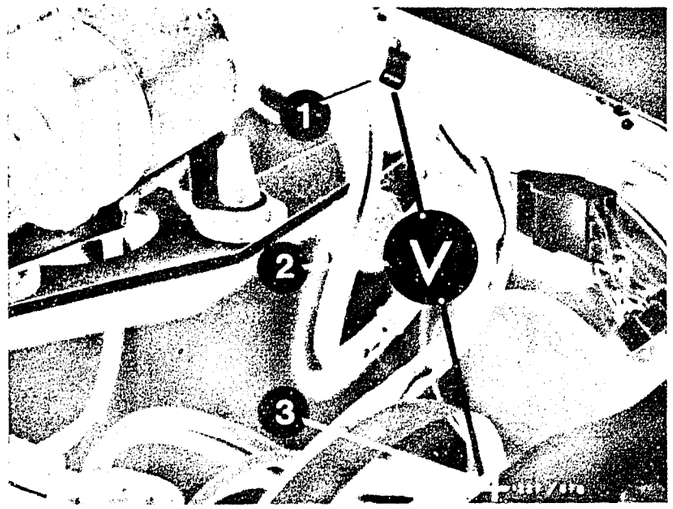
2. If continuous battery voltage is indicated at step 2, check lead from anti-knock control unit connector terminal 5 to the diagnostic connector for a short to ground.

Eliminate short to ground.

If there is no short to ground, replace anti-knock control unit.

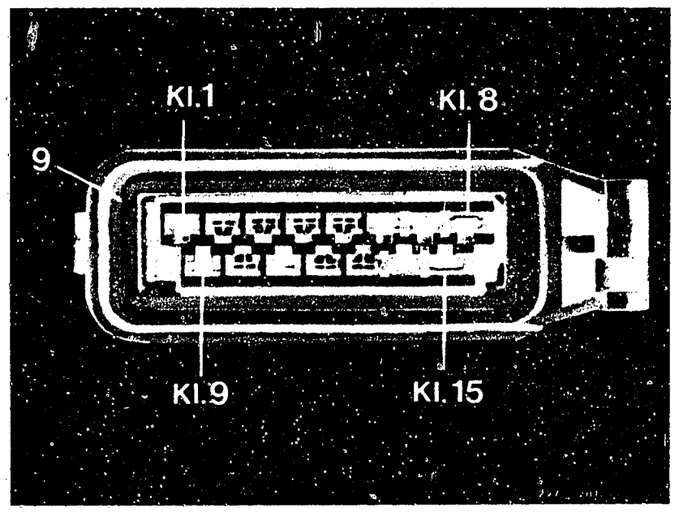
yes

Continued at C 3/C 4



1 = Diagnostic connector
2 = Analog voltmeter
3 = Positive battery terminal

9 = Anti-knock control unit connector



yes

Check throttle valve switch idle contact

Switch ignition off. Unplug anti-knock control unit connector. See illustration. Connect voltmeter to term. 1 (positive) and term. 4 (negative). Throttle valve is in idle position.

Switch on ignition.

Voltmeter must indicate battery voltage.

Open throttle valve 1...2° (idle contact is open).

Voltmeter must now indicate < 10 V.

Are voltage values OK?

yes

Continued at C 7/C 8

no

Switch off ignition.

Unplug throttle valve switch connector.

Connect ohmmeter to the following one after the other:

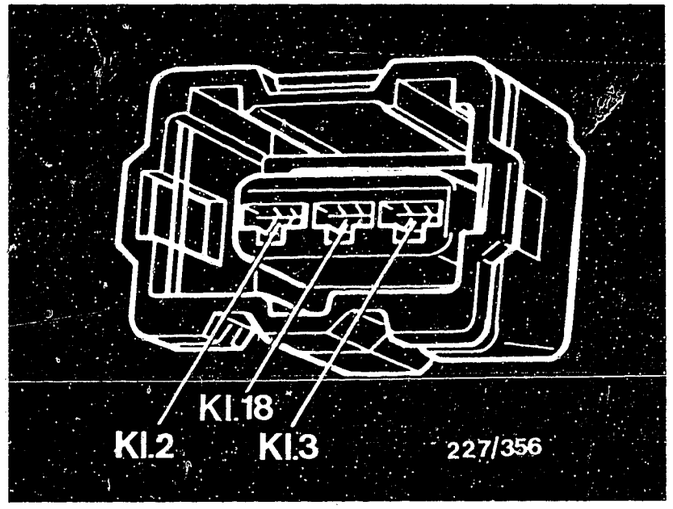
throttle valve switch connector		anti-knock control unit connector
term. 2	and	term. 4

Ohmmeter must indicate approx. 0.2 Ω (continuity).
If ∞Ω is indicated, eliminate discontinuity.

throttle valve switch connector		battery
term. 18	and	term. 31

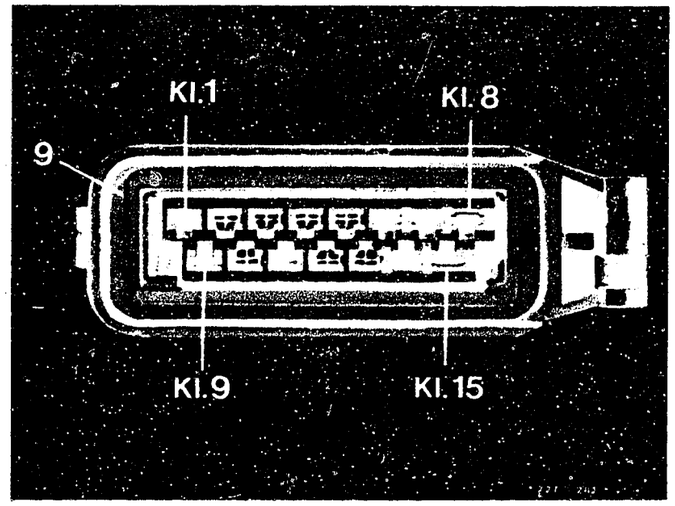
Ohmmeter must indicate approx. 0Ω (continuity).
If ∞Ω is indicated, eliminate discontinuity.

Continued at C 5/C 6



Throttle valve switch connector

9 = Anti-knock control unit connector



Continued

Attach throttle valve switch connector.

Connect voltmeter to terminals 1 (positive) and 4 (negative) of unplugged anti-knock control unit connector.

Switch on ignition.

Loosen mounting bolts of throttle valve switch slightly (see arrow, bottom photograph) and rotate the switch until the idle contact audibly clicks and the voltmeter indicates approximately the battery voltage.

If no battery voltage is indicated, replace the throttle valve switch.

Adjustment check:

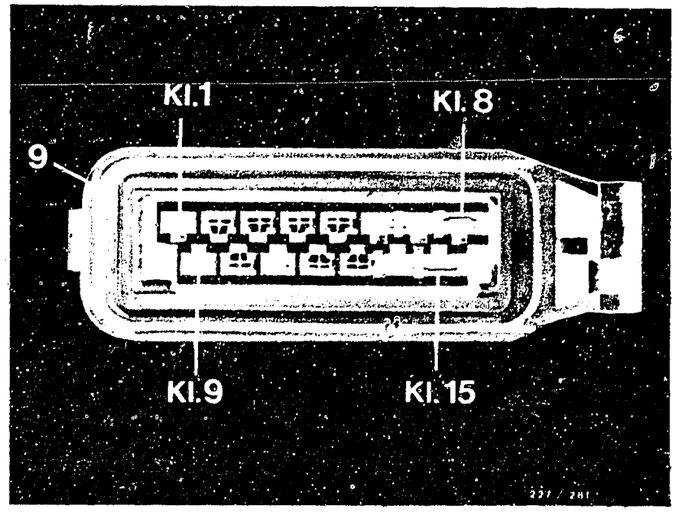
Open throttle valve slightly.

Idle contact must click audibly.

Voltmeter must indicate 0 V.

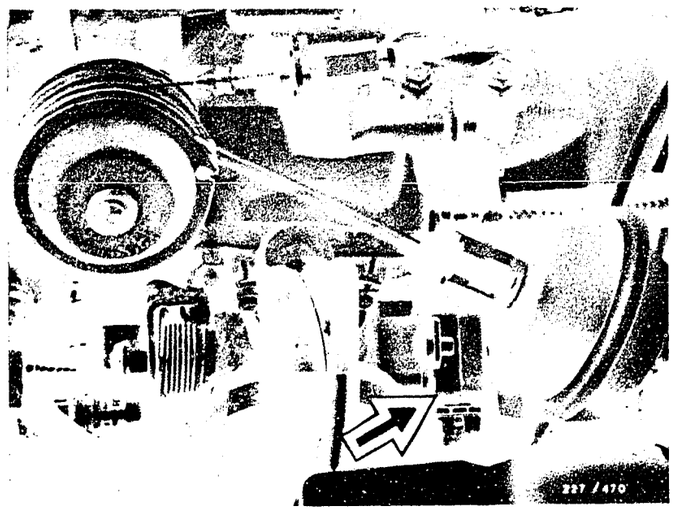
yes

Continued at C 7/C 8



9 = Anti-knock control unit connector

Throttle valve switch



yes

Check ignition timing adjustment.

Remove non-insulated connector from anti-boilover switch. See top photograph.
Start engine and briefly run up to >1000 min^{-1}. Then run at idle (700 ... 800 min^{-1}).

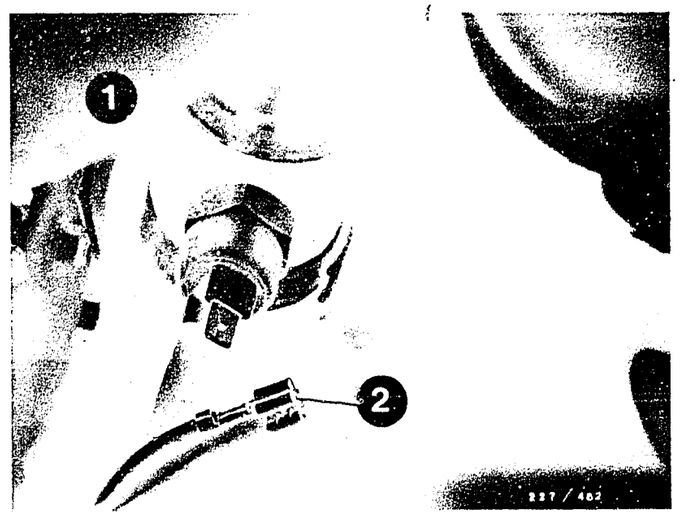
Caution:
Throttle valve switch (idle contact) must be closed. (If the test equipment indicates an obviously incorrect speed, connect a dropping resistor in series or make necessary conversion to the engine tester.)

Check timing mark with timing light.

Ignition timing adjustment must be 12 ±1° before TDC. See bottom photograph.

Is ignition timing adjustment OK?

no → Loosen ignition distritubor mount and turn distributor in advance direction to 12 ±1° before TDC.

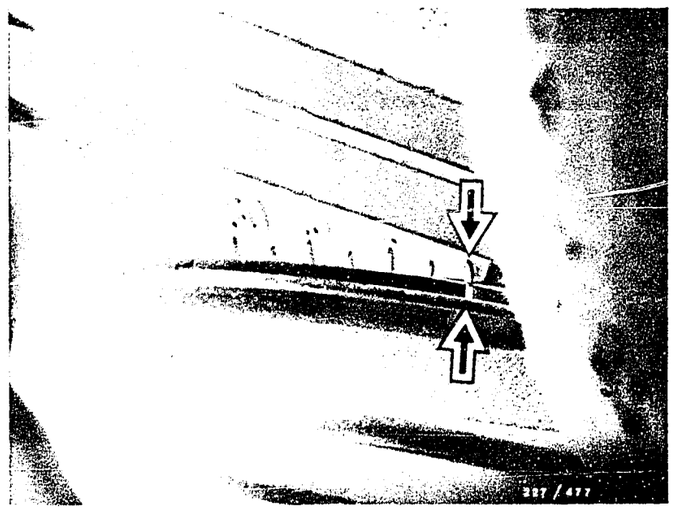


1 = Anti-boilover switch
2 = Connector (not insulated)

yes

Continued at C 9/C 10

Timing mark



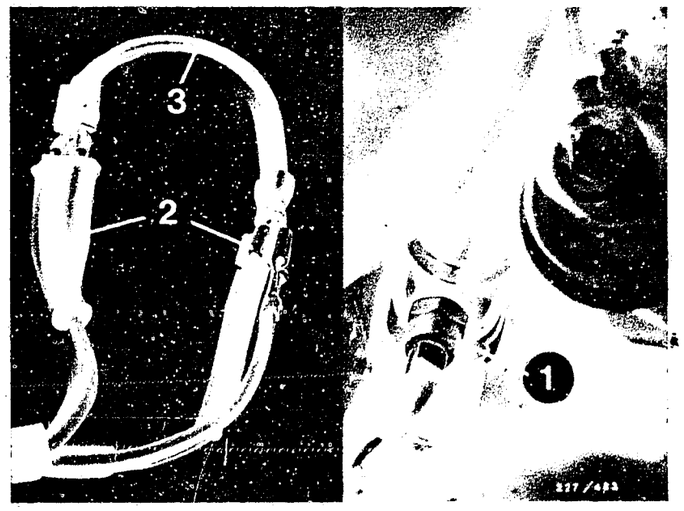
yes

Check control line from anti-boilover switch

Switch off ignition.
Unplug both anti-boilover switch connectors and bridge them with an auxiliary lead. See top photograph.
Unplug anti-knock control unit connector.
Attach voltmeter to term. 10 (positive) and term. 11 (negative) of unplugged knock regulator connector. See bottom photograph.
Switch on ignition.
Voltmeter must indicate approximately the battery voltage.

Is voltage value OK?

no → Check lead from anti-knock control unit connector terminal 10 to ignition/ starter switch for continuity. Eliminate discontinuity.



1 = Anti-boilover switch
2 = Anti-boilover switch connector
3 = Auxiliary lead

yes

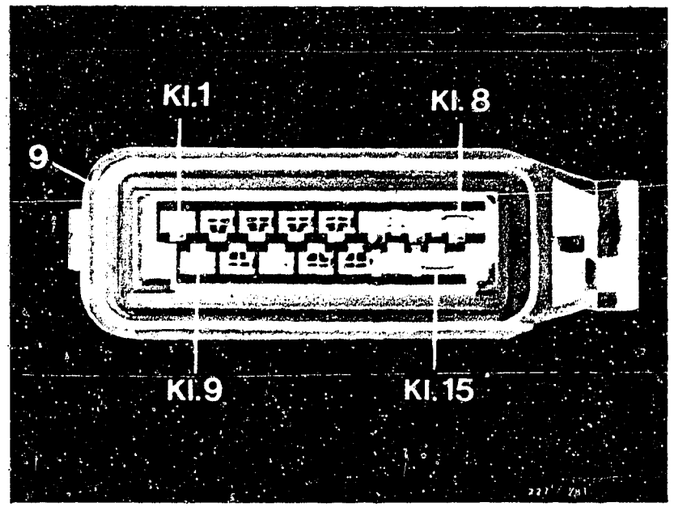
Check anti-boilover switch.

Switch off ignition.
Both anti-boilover switch connectors are unplugged.
Connect ohmmeter to anti-boilover switch.
Resistance should be:
approx. 0Ω at >approx. 103°C
∞Ω at <approx. 103°C

Are resistance values OK?

no → Replace anti-boilover switch.

9 = Anti-knock control unit connector



yes

Continued at C 11/C 12

yes

Check fan motor.

Remove both anti-boilover switch connectors and bridge them with an auxiliary lead. See top photograph.

Switch on ignition.

Fan motor must run.

Does fan motor run?

no

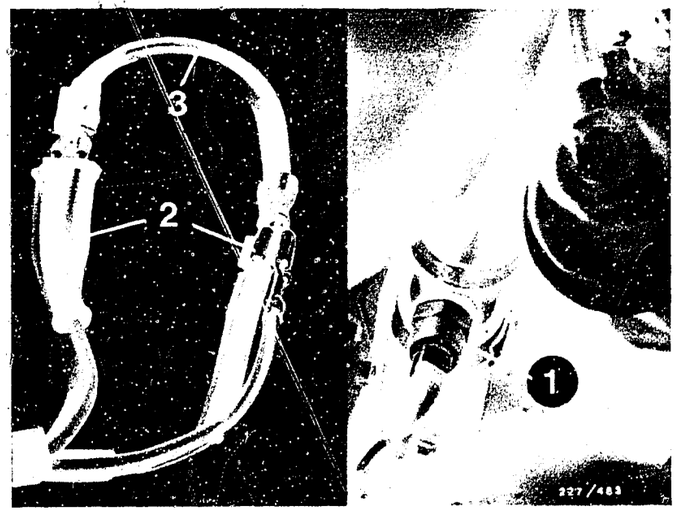
Check lead from anti-boilover switch connector to fan motor and motor ground connection for continuity.

Eliminate discontinuity.

If no discontinuity is found, replace fan motor.

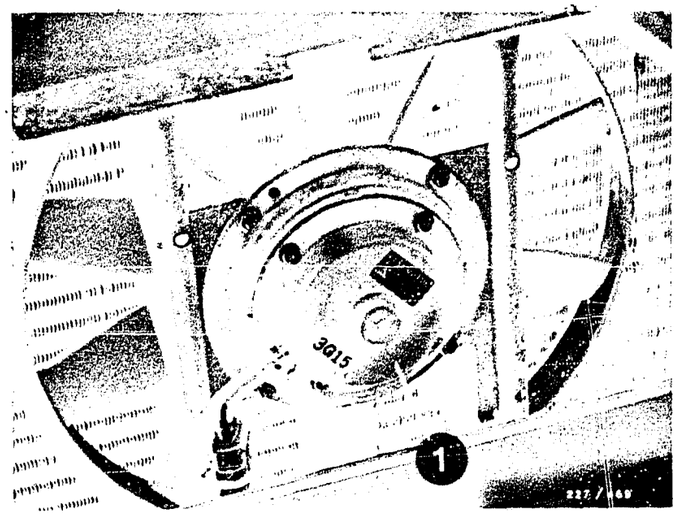
yes

Continued at C 13/C 14



1 = Anti-boilover switch
2 = Anti-boilover switch connector
3 = Auxiliary lead

Fan motor



yes

Check anti-boilover function

Remove both anti-boilover switch connectors and bridge them with an auxiliary lead. See top photograph.

Start engine and briefly run up to >1000 min^{-1}. Then run at idle.

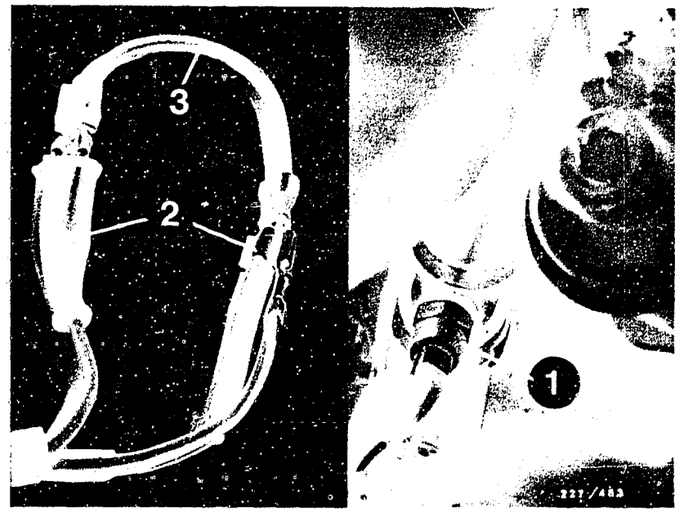
(If the test equipment indicates an obviously incorrect speed, connect a dropping resistor in series or make necessary conversion to the engine tester.)

Check timing mark with timing light.

Timing angle must be 23 ... 27° before TDC.

Is timing angle correct?

no → Replace anti-knock control unit.

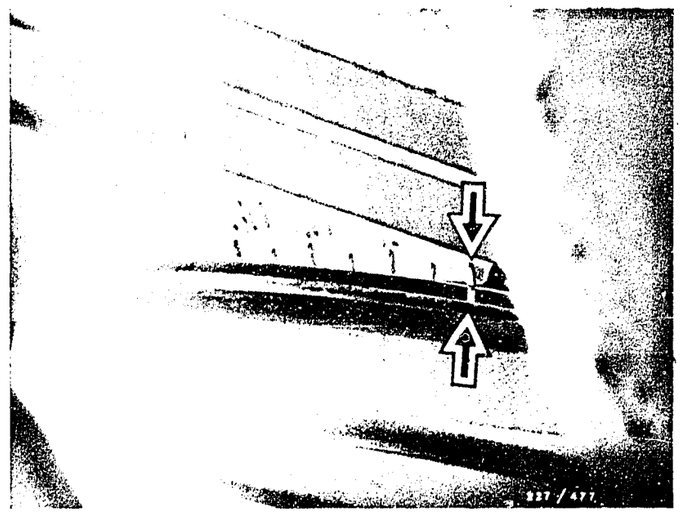


1 = Anti-boilover switch
2 = Anti-boilover switch connector
3 = Auxiliary lead

yes

Continued at C 15/C 16

Timing mark



yes

Check voltage from anti-knock control unit.

The voltage from the anti-knock control unit is OK if the

SELF-DIAGNOSIS SYSTEM

has not indicated 2 voltage pulses on the voltmeter.

Is self-diagnosis system OK?

yes

Continued at C 19/C 20

no

Switch off ignition.
Unplug anti-knock control unit connector. Push back the handle cover on the anti-knock control unit connector after removing the fastening screw and rubber seal. See top photograph.
Reconnect anti-knock control unit.
See bottom photograph.

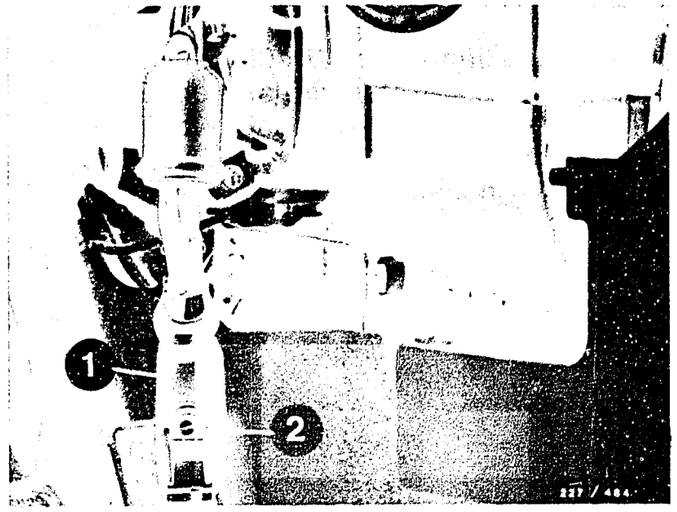
Connect voltmeter to term. 1 (positive) and term. 11 (negative) of anti-knock control unit connector.
Run engine at idle.
Voltmeter must indicate >10.5 V.
If voltage is >10.5 V, replace anti-knock control unit.

If voltage is <10.5 V:

1. Connect positive lead of voltmeter to positive battery terminal and negative lead to terminal 1 of anti-knock control unit connector. Switch on ignition and run engine at idle. Voltage drop must not exceed 0.5 V. Eliminate voltage drop between positive battery terminal and anti-knock control unit connector terminal 1.

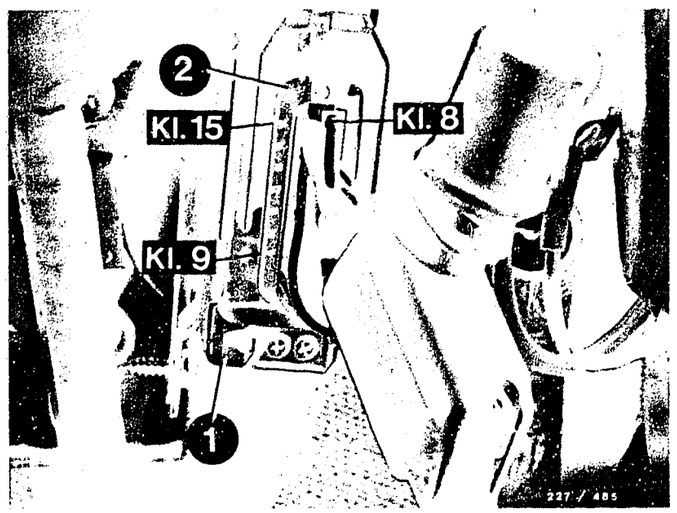
2. Connect negative lead of voltmeter to negative battery terminal and positive lead to terminal 11 of anti-knock control unit connector. Switch on ignition and run engine at idle. Voltage drop must not exceed 0.5 V. Eliminate voltage drop between negative battery terminal and anti-knock control unit connector terminal 11.

Continued at C 17/C 18



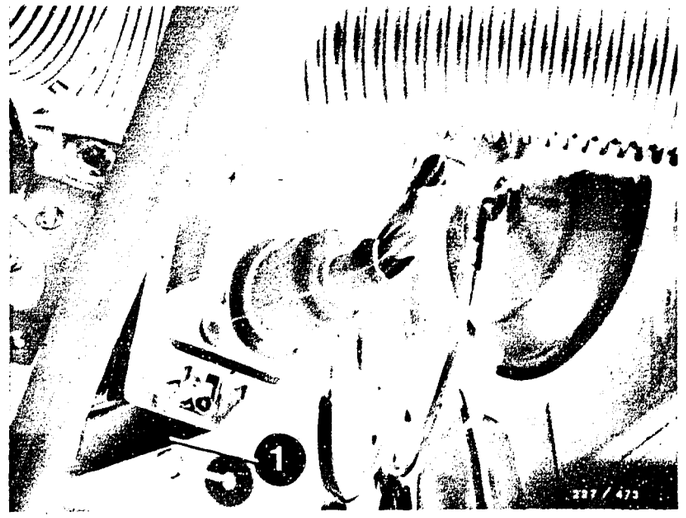
1 = Handle cover
2 = Fastening screw

1 = Anti-knock control unit
2 = Anti-knock control unit connector



Continued

3. If no voltage drop is measured under 1 and 2 above, replace anti-knock control unit.



1 = Anti-knock control unit

yes

Continued at C 19/C 20

yes

Check knock sensor.

The knock sensor is OK if the

SELF-DIAGNOSIS SYSTEM

has not indicated 4 voltage pulses on the voltmeter.

Is self-diagnosis system OK?

no

1. Visual check:

Unplug knock sensor connector.

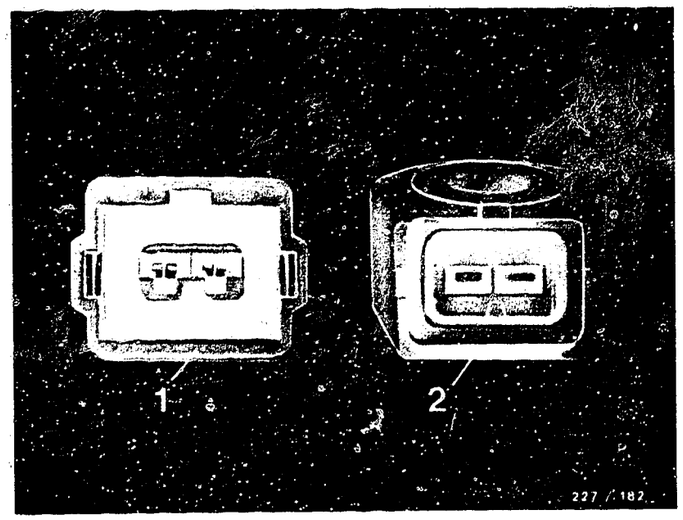
Check male and female contacts of knock sensor connector for oxidation.

Remove oxidation.

Reconnect knock sensor connector.

Activate self-diagnosis system.

If self-diagnosis system is still not working correctly, follow steps 2 through 5 below.



1 = Male knock sensor connector

2 = Female knock sensor connector

Continued at C 23/C 24

Continued at C 21/C 22

Continued

Switch off ignition.
Unplug knock sensor and anti-knock control unit connectors.

2. Attach ohmmeter between:

knock sensor connector		anti-knock control unit connector
term. 8	and	term. 8
term. 15	and	term. 15

Ohmmeter must indicate approx. 0Ω (continuity).
Eliminate discontinuity.

3. Attach ohmmeter between:

knock sensor connector		anti-knock control unit connector
term. 8	and	term. 11

Ohmmeter must indicate ∞Ω.
If ohmmeter indicates approx. 0Ω, (continuity), eliminate short to ground in knock sensor lead between terminals 8 and 11.

4. Reconnect knock sensor connector; attach ohmmeter between:

knock sensor connector		anti-knock control unit connector
term. 8	and	term. 15

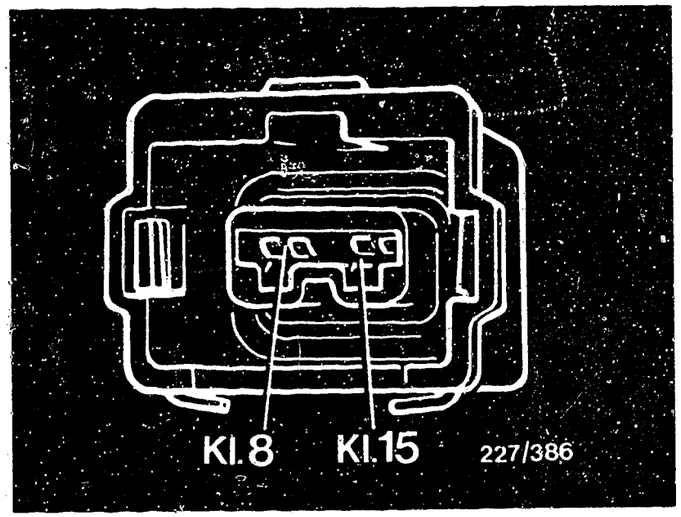
Ohmmeter must indicate 270 ... 330kΩ.
If resistance values not OK, replace knock sensor.

5. Check tightening torque of knock sensor mounting bolt (11 ... 15 Nm).

If steps 1 through 5 OK, replace knock sensor.

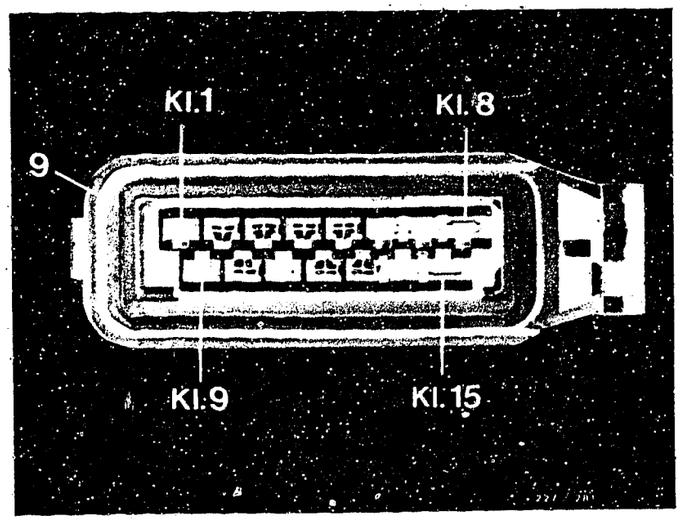
yes

Continued at C 23/C 24



Knock sensor connector

9 = Anti-knock control unit connector



yes

Load signal (from LH-Jetronic)

The load signal is OK if the

SELF-DIAGNOSIS SYSTEM

has not indicated 5 voltage pulses on the voltmeter.

Is self-diagnosis system OK?

no

Switch off ignition.

Unplug anti-knock control unit connector.

Push back the handle cover on the anti-knock control unit connector after removing the fastening screw and rubber seal. See top photograph.

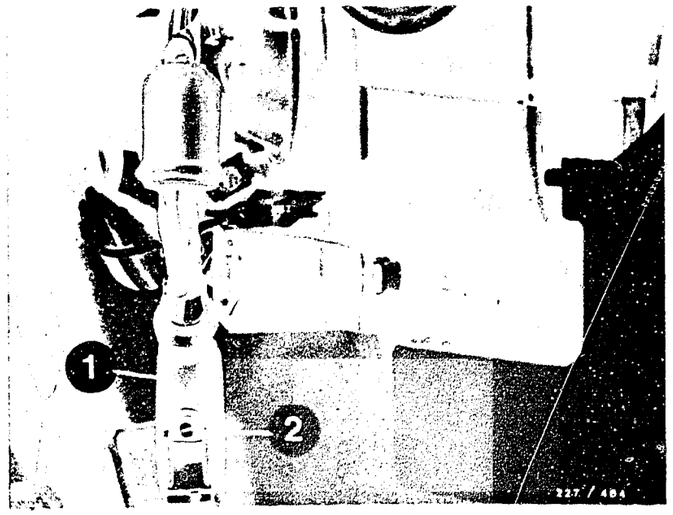
Reconnect anti-knock control unit.

Run engine at idle.

Connect voltmeter to term. 14 of anti-knock control unit connector (positive) and vehicle ground. See bottom photograph.

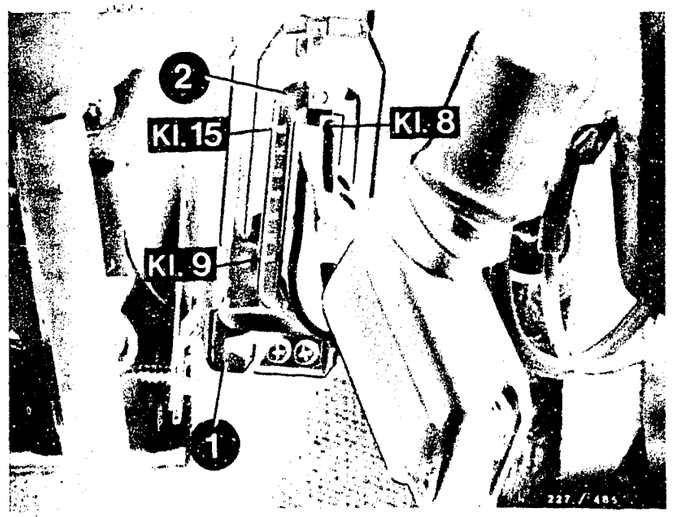
Voltmeter must indicate > 0.1 V.

If voltage is < 0.1 V, replace anti-knock control unit.



1 = Handle cover
2 = Fastening screw

1 = Anti-knock control unit
2 = Anti-knock control unit connector



yes

Continued at D 3/D 4

Continued at D 1/D 2

Continued

yes

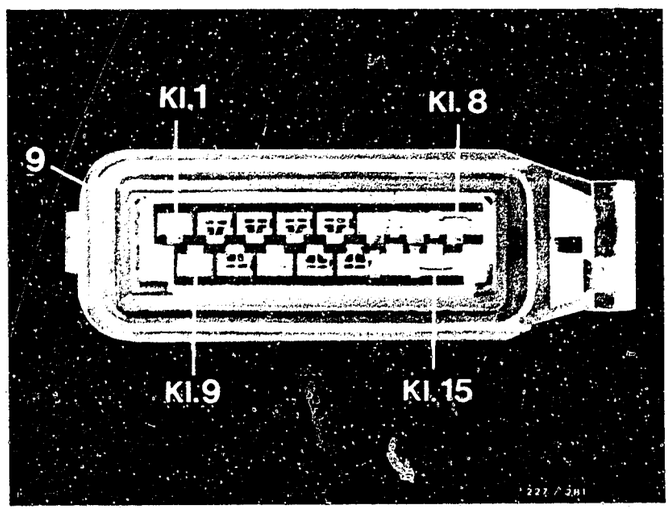
If 0 V is indicated:

Switch off ignition and unplug anti-knock control unit and LH-Jetronic control unit connectors.

Check lead between anti-knock control unit connector terminal 14 and LH-Jetronic control unit connector terminal 24 for continuity.

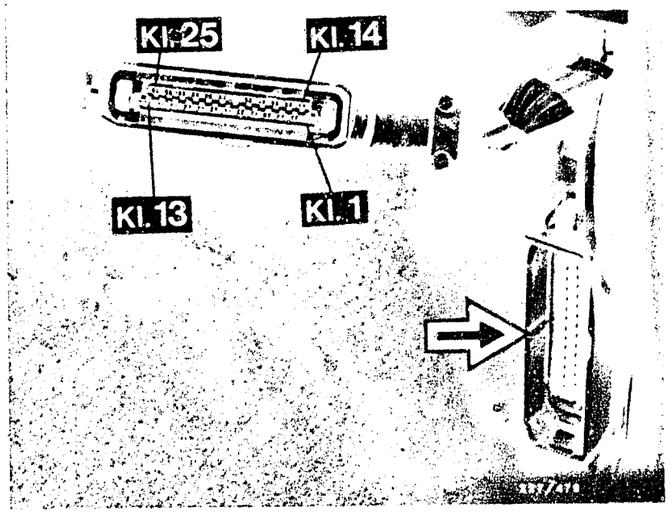
Eliminate discontinuity.

If there is no discontinuity, replace LH-Jetronic control unit.



9 = Anti-knock control unit connector
connector

LH-Jetronic control unit connector



Continued at D 3/D 4

yes

Check voltage from control unit.

Pull back rubber sleeve on control unit connector.
Attach test prods of voltmeter to terminals 4 and 2 of the control unit connector.
Run engine at idle.
The measured voltage must be 12 ... 14 V and must not drop more than 1 V below battery voltage.

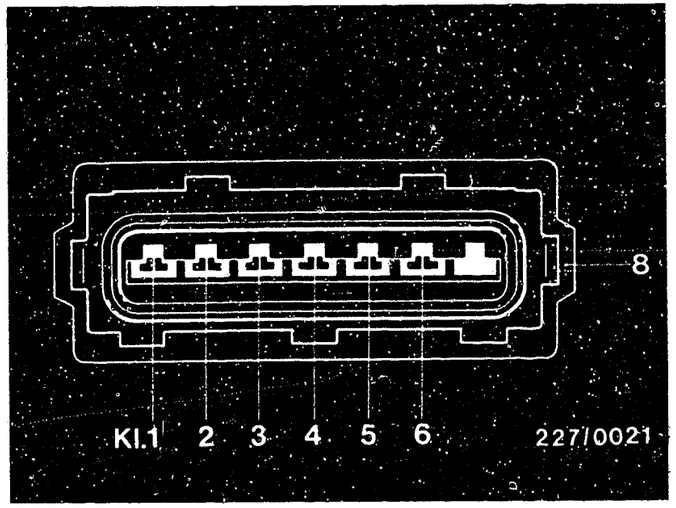
Are voltage values OK?

no

Disconnect positive and negative battery cables, and unplug control unit connector.
Switch on ignition.

Check leads between the positive battery terminal and control unit connector terminal 4, and between the negative battery terminal and control unit connector terminal 2 for contact resistance.
Total contact resistance must not exceed 0.3Ω (allow for resistance of instrument lead and test prods).

Eliminate contact resistance.



8 = Control unit connector

yes

Check voltage from ignition coil.

Connect voltmeter between ignition coil terminal 15 and the negative battery terminal. Run engine at idle.
The measured voltage must be at least 10 V.
Are voltage values OK?

no

Disconnect positive battery cable.
Switch on ignition.
Check leads between positive battery terminal and ignition coil terminal 15 for contact resistance.
Contact resistance must not exceed 0.3Ω.
(Allow for resistance of instrument lead and test prods.)

Eliminate contact resistance.

yes

Continued at D 5/D 6

yes

Check primary voltage.

(if MOT series oscilloscope available)

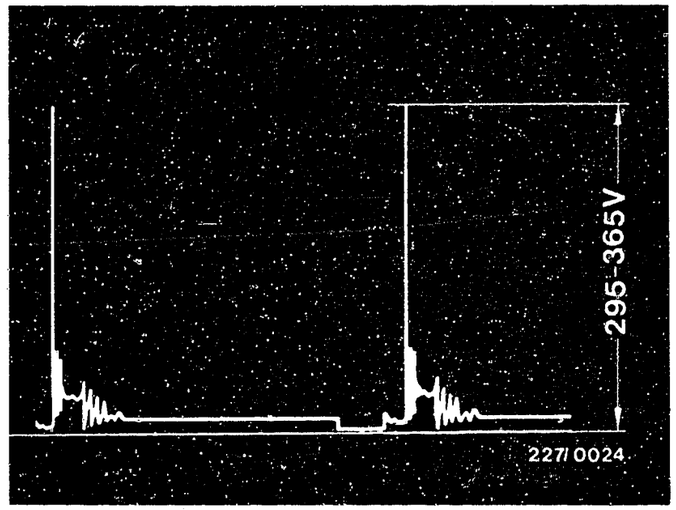
Connect oscilloscope (e.g. MOT 201) to ignition coil as per operating instructions.

Run engine at idle.

The primary voltage must be 295 ... 365 V (See illustration).

Is voltage value OK?

no → Replace control unit.



yes

Ignition system OK

Test completed.

Tests beginning at coordinate E 1 not necessary.

Note:

If customer complaint still exists, fault may be in fuel system or engine may have mechanical problem.

No primary signal or no ignition spark

(continued from B 15/B 16)

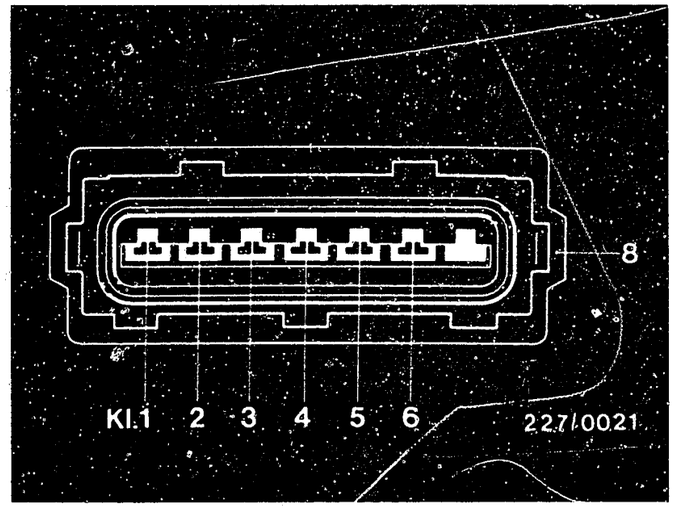
yes

Check voltage from control unit.

Unplug control unit connector.
Connect positive lead of voltmeter to terminal 4 and negative lead to terminal 2 of control unit connector.
Switch on ignition.
Voltmeter must indicate battery voltage.

no

Check leads and connections between ignition/starter switch and control unit connector terminal 4 and ground lead terminal 2 for discontinuity.
Eliminate discontinuity.



8 = Control unit connector

yes

Check primary circuit.

Connect positive lead of voltmeter to terminal 1 and negative lead to terminal 2 of unplugged control unit connector.
Switch on ignition.
Voltmeter must indicate battery voltage.

Is voltage value OK?

no

Check lead from ignition/starter switch to ignition coil terminal 15, the primary winding of the ignition coil, and the lead from ignition coil terminal 1 to control unit connector terminal 1 and ground lead terminal 2 for continuity.
Eliminate discontinuity.

Continued at E 3/E 4

yes

Check voltage from anti-knock control unit.

Switch off ignition.

Unplug anti-knock control unit connector.

Connect positive lead of voltmeter to terminal 1 and negative lead to terminal 11 of anti-knock control unit connector.

Switch on ignition.

Voltmeter must indicate battery voltage.

Is voltage OK?

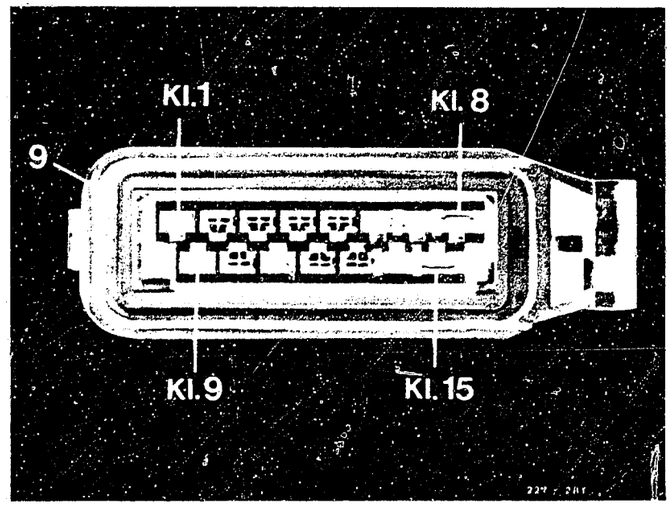
no

Check leads from ignition/ starter switch to anti-knock control unit connector terminal 1 and ground lead terminal 11 for discontinuity.

Eliminate discontinuity.

yes

Continued at E 5/E 6



9 = Anti-knock control unit connector

yes

Check male and female halves of ignition distributor connector.

Press wire retainer of ignition distributor connector (arrow).

Unplug ignition distributor connector.

Visual check:

Check male and female contacts of ignition distributor connector for oxidation.

Remove oxidation.

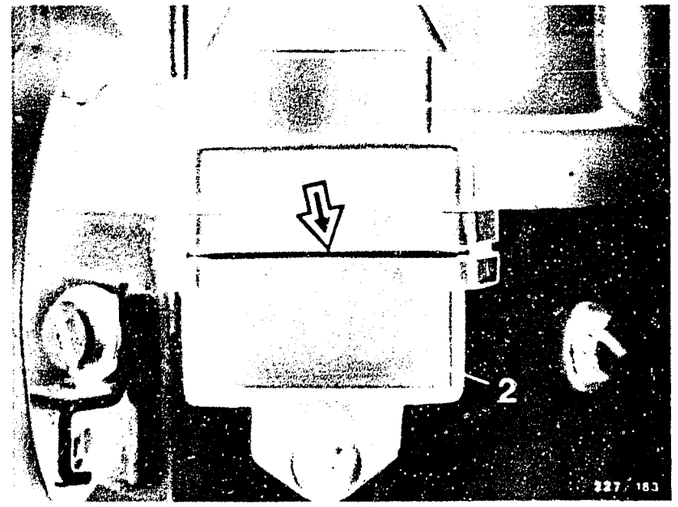
Reconnect ignition distributor connector.

Start engine.

If no primary signal or ignition spark, continue test.

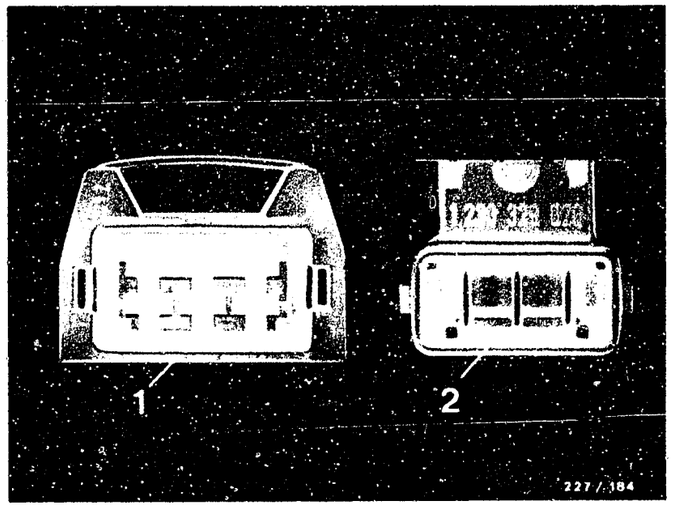
yes

Continued at E 7/E 8



1 = Male ignition distributor connector

2 = Female ignition distributor connector



yes

Check voltage to magnetic pulse generator.

Connect anti-knock control unit connector.

Pull back rubber sleeve from ignition distributor connector.

Connect positive voltmeter test prod to terminal 13 and negative prod to terminal 12.

Switch on ignition.

Voltmeter must indicate a voltage of $\geq$ 9 V.

Is voltage OK?

yes

Continued at E 9/E 10

no

Switch off ignition.

Unplug ignition distributor and anti-knock control unit connectors.

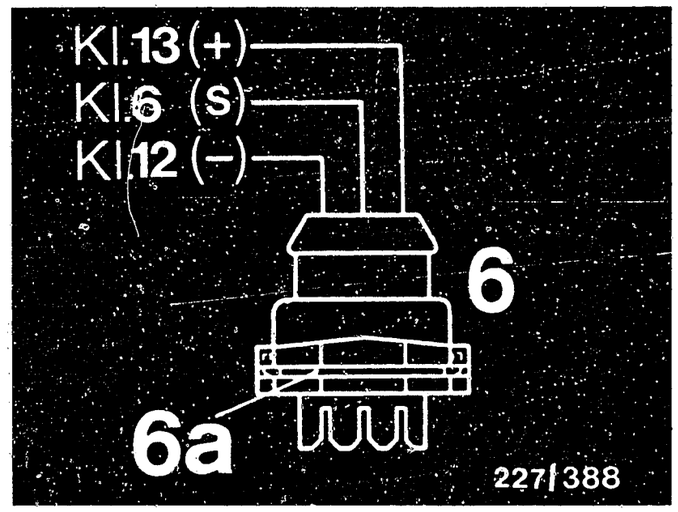
Connect ohmmeter to the following one after the other:

Ignition distributor connector		Anti-knock control unit connector
term. 13	and	term. 13
term. 12	and	term. 12

Ohmmeter must indicate approx. 0Ω (continuity) in each case.

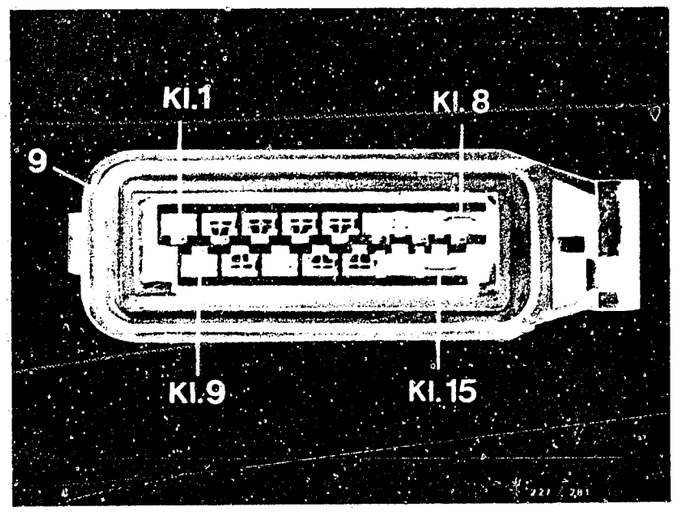
Eliminate discontinuity.

If no discontinuity is found, replace anti-knock control unit.



6 = Ignition distributor connector
6a = Wire retainer

9 = Anti-knock control unit connector



yes

Check operation of magnetic pulse generator.

Anti-knock control unit and ignition distributor connectors are connected.

Pull back rubber sleeve on ignition distributor connector.

Connect oscilloscope set to "special" range as per operating instructions.

For example MOT 201:

Connect red lead to ignition distributor connector terminal 6 (test signal).

Connect black lead to ground.

Start engine.

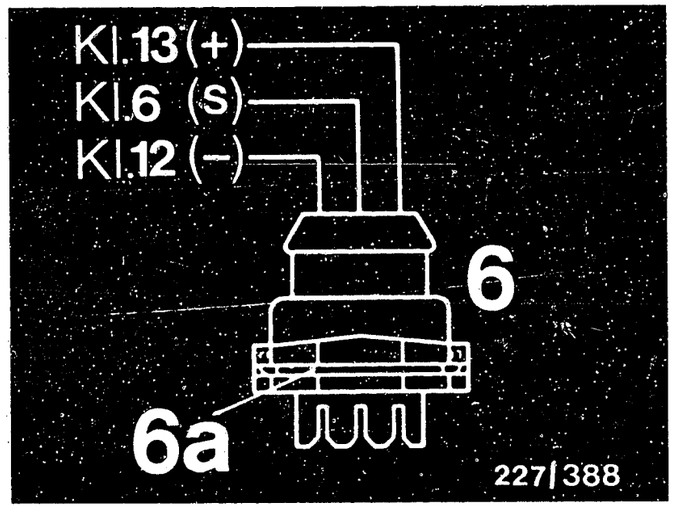
Oscilloscope must display a square wave. See illustration.

Is square wave displayed?

no → Replace magnetic pulse generator or ignition distributor.

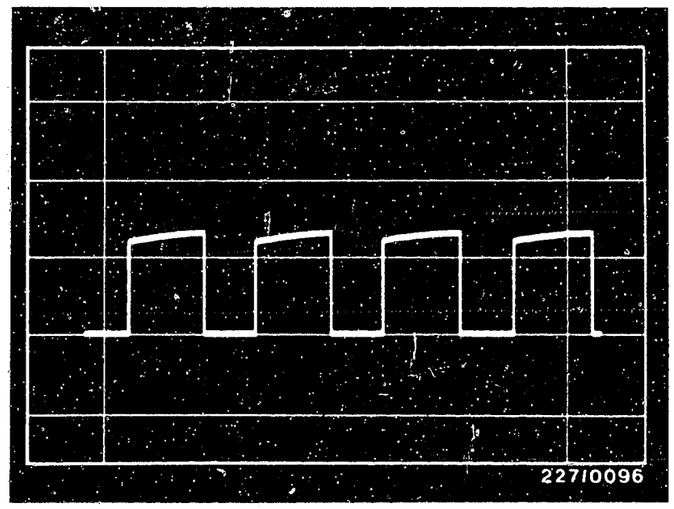
yes

Continued at E 11/E 12



6 = Ignition distributor connector
6a = Wire retainer

Square wave



yes

Check anti-knock control unit.

Anti-knock control unit and ignition distributor connectors are connected.

Connect oscilloscope set to "special" range as per operating instructions.

For example MOT 201:

Connect red lead to control unit connector terminal 5 and then to terminal 6 (test signal).

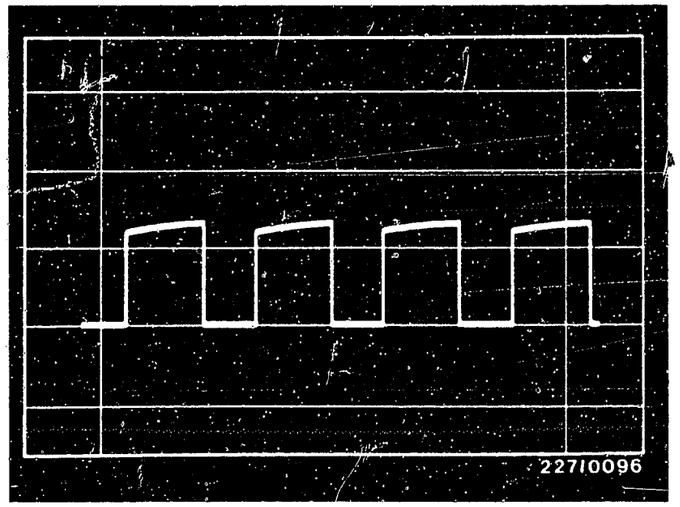
Connect black lead to ground.

Start engine.

Oscilloscope must display square wave. See illustration.

Is square wave displayed?

no → Unplug control unit and anti-knock control unit connectors.



Square wave

yes

Continued at E 15/E 16

Continued at E 13/E 14

Continued

Connect ohmmeter to the following one after the other:

Control unit connector		Anti-knock control unit connector
term. 6	and	term. 9
term. 5	and	term. 9

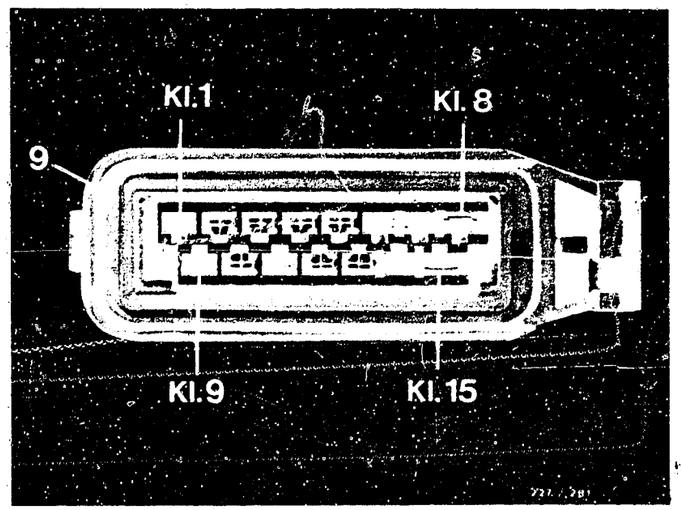
Ohmmeter must indicate approx. 0Ω (continuity) in each case.

Eliminate discontinuity.

If no discontinuity is found, replace anti-knock control unit.

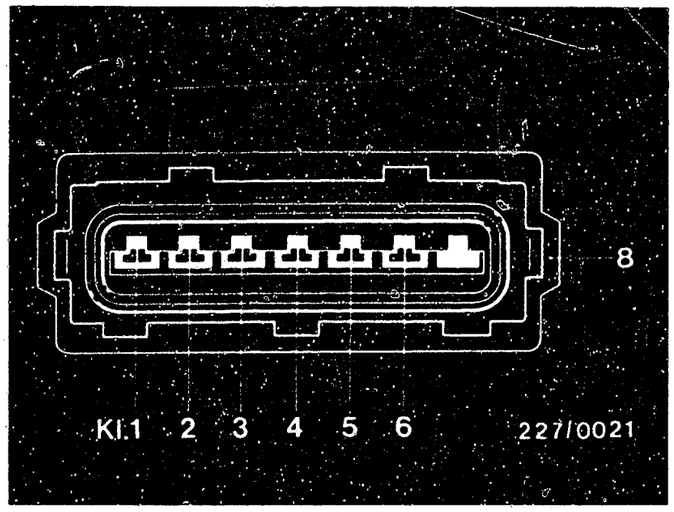
yes

Continued at E 15/E 16



9 = Anti-knock control unit connector

8 = Control unit connector



yes

Check ignition coil.

Visual check:

Remove protective cap from ignition coil and check for missing plug (see illustration) and leakage of sealing compound.

Electrical check:

Primary ignition coil winding (term. 15 and term. 1) 0.6 ... 1.0Ω. (Allow for resistance of instrument lead and test prods.)

Secondary ignition coil winding (term. 1 and term. 4) 6.4 ... 11.1Ω.

Plug present and no leakage of sealing compound?

Is resistance value OK?

no →

1. If plug is missing or sealing compound has leaked, replace control unit, anti-knock control unit and ignition coil.
2. If resistance values are not OK, replace ignition coil.

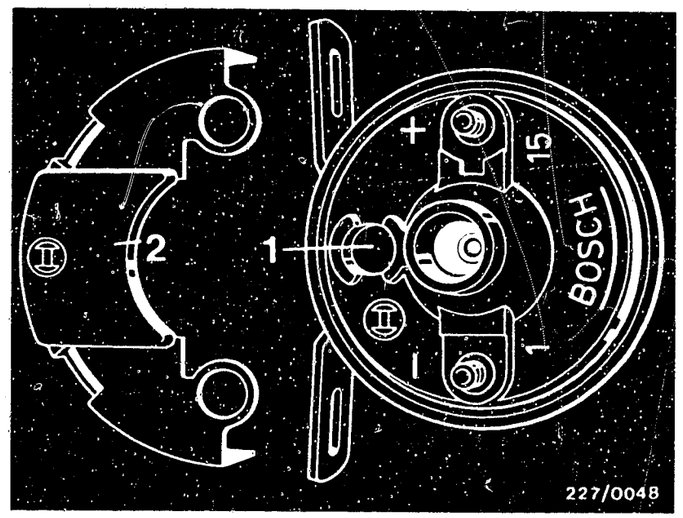
yes

Replace control unit.

Test completed.

Tests at B 17 not necessary.

Note:
If customer complaint still exists, problem may be in fuel system or engine may have mechanical problem.



1 = Plug
2 = Protective cap

After-sales Service

Technical Bulletin

22

VDT-I-227/102 B

11.1976

Danger of Accident on Semi-conductor Ignition Systems

Please be sure to pass this bulletin on to your employees for their attention.

The increased demands made on their ignition systems by modern engines, and the wish for freedom from maintenance, led some time ago to manufactures starting to equip their vehicles with semi-conductor ignition systems as original equipment. In most cases the performance of nearly all makes of such systems is higher than that of conventional systems, and further improvements are to be expected. This means that semi-conductor ignition systems have reached the point where contact with "live" parts or contacts (whether on the primary side or the secondary side) can prove fatal.

In this connection we should like to point out to you that the laws valid in your country regarding work on high-voltage systems must be adhered to when working on, or testing, semi-conductor ignition systems.

As a matter of principle, when working on such ignition systems the ignition is to be switched off. Included in such work are the following operations:

- Connection of engine testing equipment (timing light, dwell-tach tester, ignition oscilloscope etc.).
- Replacement of ignition system parts (spark plugs, ignition coil, ignition distributor, H.T. ignition cables etc.).

If it is necessary to switch on the ignition in order to test the system or make adjustments on the engine (to the carburetor for instance), then lethal voltages are present throughout the entire system.

This means that the danger of accident exists not only at individual components in the system (e.g. ignition distributor, ignition coil, trigger box, ignition harness), but also at the wiring harness (e.g. connection for the tachometer, diagnostic connector), on terminals, and on test equipment.

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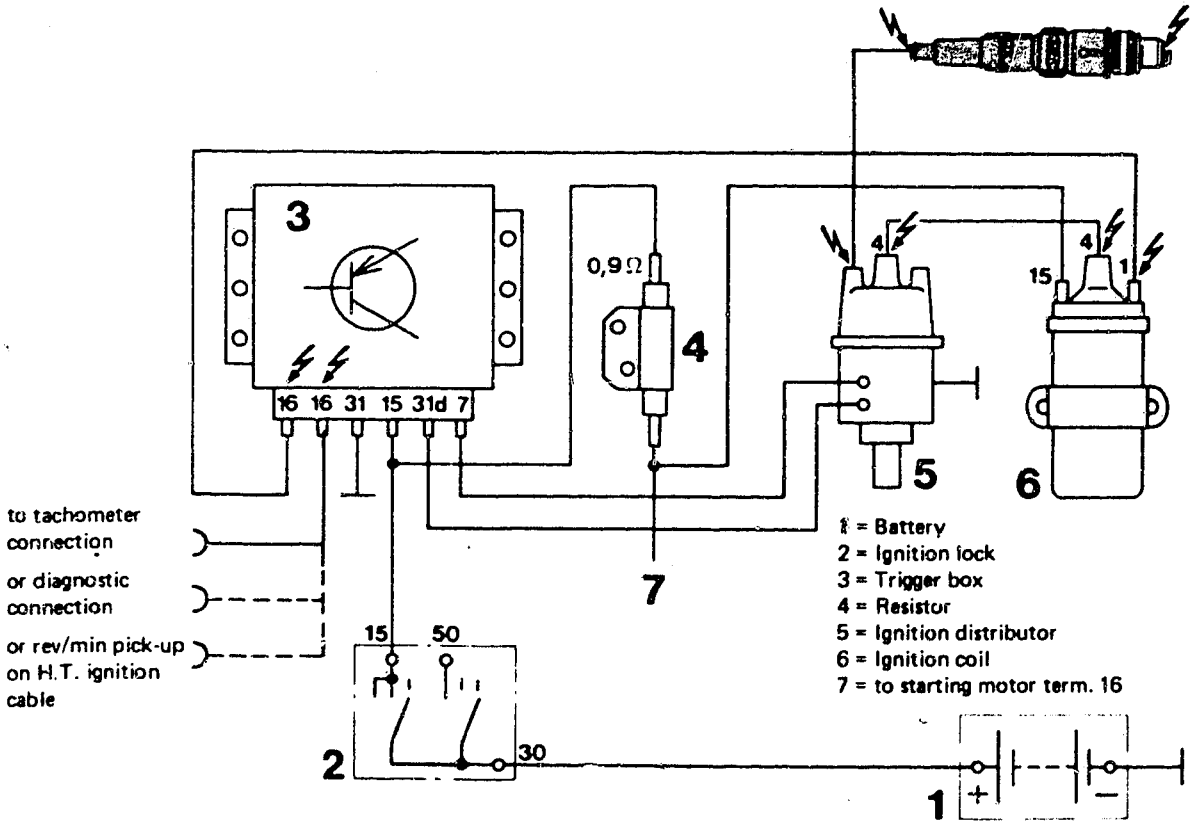
In addition, in the case of the capacitor-discharge ignition system (CDI), danger of accident is also present under the following circumstances:

- Operation of the trigger box without the ignition transformer.
- At the trigger box, (removed), relatively soon after it has been switched off (capacitor discharge).

Below is a typical terminal diagram of a semi-conductor ignition system, the danger points are marked with red high-voltage arrows. We would point out that all semi-conductor ignition systems, even the older ones, are to be regarded as dangerous in the sense as defined by this bulletin.

Please address any queries or comments concerning the contents of this publication to our representative in your country.



Terminal diagram

After-sales Service

Technical Bulletin

EFFECTS OF ELECTRICAL AND ELECTRONIC SYSTEMS ON HEART PACEMAKERS

e.g. ignition systems, Jetronic, Motronic, ABS

VDT-I-227/107 En
1.1981

Please ensure without fail that this Bulletin is passed on to your employees for their attention!

We have often been asked by some of our customers whether or not patients with heart pacemakers are endangered in any way by ignition systems. This theme was recently the subject of an examination carried out by the Ignition System Development Department of Robert Bosch GmbH in conjunction with Dr. Thull, lecturer at the Central Institute for Biomedical Technology at the University of Erlangen-Nürnberg and Biotronic GmbH & Co. of Berlin, a manufacturer of heart pacemakers. The magazine "Biomedizinischen Technik" (5/80) listed the results.

The most important discoveries in this practice can be summarized from the examination report as follows:-

1. Heart pacemakers corresponding to the latest state of the art are not affected by radiation (electromagnetic fields) from ignition systems.
2. With a stationary engine and the ignition switched off the heart pacemaker is not affected by any part of the ignition system, even when unintentionally touched. Maintenance work in the engine compartment, for example, can then be carried out without any danger.
3. With the engine running or stationary with the ignition switched on, touching current-carrying parts of the ignition system, as well as parts of any other electrical system, presents a certain danger for everybody. The heart pacemaker can here be affected under certain conditions (voltage, current and frequency).
   Patients with heart pacemakers should therefore at all costs avoid touching current-carrying parts of electrical systems.
4. Furthermore, patients with heart pacemakers are more inclined to psychic shock effects than other people, even when they receive just a harmless electric shock, because many such patients are conscious of the increased danger to the cardiac activity.

We therefore consider it inadvisable for patients with heart pacemakers to be employed in workshops or on vehicles where ignition systems are being tested or repaired. If any members of your staff have heart pacemakers please carry out the necessary measures.

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We would like to add that heart pacemakers are not expected to be affected in any way by interference from other electronic products and systems which we manufacture, such as the Antiskid System (ABS), Jetronic, Motronic, because the much greater radiation intensity of the ignition systems examined in normal use has not caused any interference to heart pacemakers corresponding to the latest state of the art.

If you should receive questions on this matter from customers, please inform them accordingly.

After-sales Service

Technical Bulletin

KNOCK SENSOR
0 261 231 ..

VDT-I-227/110 En
3.1983

Procedures for after-sales service

Description

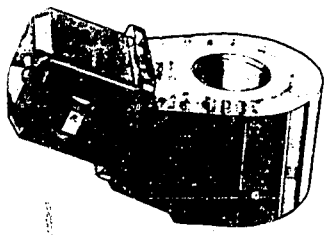
The knock sensor contains an active piezoceramic element. It is screwed to a chosen position on the engine block and sends a structure-borne signal which is processed further by an electronic control unit.

User

Saab is the first vehicle manufacturer to use the knock sensor which is being fitted to various turbo vehicles.

Components

Knock sensor 0 261 231 ... *



* The exact part numbers are given on the appropriate vehicle-equipment microcards AA... .

Service/exchange parts

The knock sensor is a service part and is supplied by Bosch. The remaining components of the knock control are products made by other firms.

Technical documentation

Technical bulletin "New product" VDT-I-227/10 En.

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Training

Special training is not necessary.

Retrofitting

The knock sensor is not intended for retrofitting.

Warranty procedure

Components on which a claim is being made should be sent for inspection during the warranty period to our representative in your country. He should forward it to:

ROBERT BOSCH GMBH
KH/LAV - Auspackraum
zur Weiterleitung an K1/VAK2
7000 Stuttgart 30
Federal Republic of Germany

This regulation applies until further notice.

After-sales Service

Technical Bulletin

BREAKERLESS TRANSISTORIZED IGNITION SYSTEM 22

Warranty note VDT-I-227/103 En
Hybrid construction trigger boxes 3.1979
0 227 100 100 for ignition distributor
with Hall generator (TCI-h)
0 227 100 102 for ignition distributor
with induction-type
pulse generator (TCI-i)

Apart from the well-known TCI trigger boxes 0 227 100 0.. , trigger boxes of hybrid construction have been fitted as standard since 9.78 (Fig. 1).

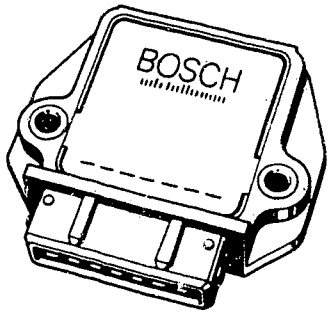

Fig. 1

Warranty procedure

If the complaints are justified, all these hybrid trigger boxes are to be sent, along with completed warranty documents, to your authorized representative for forwarding to the following address:

ROBERT BOSCH GMBH
KH/LAV - Auspackraum

zur Weiterleitung an K1/VAK 21

D-7000 Stuttgart 30

This instruction remains valid until further notice.

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After-sales Service

Technical Bulletin

NEW DESIGNATIONS FOR IGNITION SYSTEMS

VDT-I-227/108 En
1.1983

The introduction of new ignition systems has made it necessary to reclassify all designations.

The designations listed below will be used immediately in KH workshop and sales literature.

Designation	Abbrev'd code	Meaning	Switching	Ignition control and spark advance	High-voltage distribution
Coil ignition	SZ (CI)	---------	Mechanical (breaker points)	Mechanical (ignition distributor)	Mechanical (ignition distributor)
Transistor-ized coil ignition	TSZ-K (TCI-c)	K=breaker-triggered	Electronic (trigger box)	Mechanical (ignition distributor)	Mechanical (ignition distributor)
Trigger box with conventional circuit techniques	TSZ-I* (TCI-i)	I=Induction-type pulse generator	Electronic (trigger box)	Mechanical (ignition distributor)	Mechanical (ignition distributor)
	TSZ-H	H=Hall generator	Electronic (trigger box)	Mechanical (ignition distributor)	Mechanical (ignition distributor)
Transistor-ized ignition	TZ-I* (TI-i)	I=Induction-type pulse generator	Electronic (trigger box)	Mechanical (ignition distributor)	Mechanical (ignition distributor)
(Trigger box in Hybrid technique)	TZ-H* (TI-h)	H=Hall generator	Electronic (trigger box)	Mechanical (ignition distributor)	Mechanical (ignition distributor)

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Designation	Abbrev'd code	Meaning	Switching	Ignition control and spark advance	High-voltage distribution
Breakerless semiconductor ignition with or without knock control	EZ EZ-K	- K=Knock control	Electronic (trigger box or control unit)	Electronic (control unit)	Mechanical (ignition distributor or high-voltage distributor)
Distributor-less ignition with or without knock control	VZ VZ-K	- K=Knock control	Electronic (control unit)	Electronic (control unit)	Electronic (dual-spark ignition coil, or 1 ignition coil for each spark plug)

*Note: The ignition system can also be equipped with a DLS unit (digital idle stabilization) or with an ELS unit (electronic idle stabilization) or with an ESV unit (electronic ignition retardation).

After-sales Service

Motor Vehicle Service Information

INCORRECT DISPLAY OF ROTATIONAL SPEED AND DWELL ANGLE ONLY WITH TRIGGER BOXES 0 227 100 ... (TCI-i, TCI-h) WITH CURRENT LIMITATION

VDT-I-Gen. 030 En
6.80
Supersedes Ed. 3.80

For additional information see VDT-I-Gen. 032 En

1. General

In comparison with conventional ignition systems, transistorized ignition systems with current limitation have different primary voltage characteristics. During the dwell period the voltage at terminal 1 of the ignition coil may assume values from 1.5 V to battery voltage (or greater). This may lead to an incorrect display of rotational speed and dwell angle when testing the ignition system. However, there is no functional defect in the ignition system, and, for this reason, the trigger box must not be replaced. Incorrect displays may occur with the testers listed below:

MOT	001.00 001.01 001.02 001.04 002.00	Rotational-speed display O.K. with these testers	KTE	001.00 001.02 001.03

By now, the following vehicles may be fitted with breakerless ignition systems with current limitation:

Audi	(Bosch/Fairchild-ignition system)	Mazda	(Mitsubishi ignition system)
BMW	(Bosch ignition system)	Mitsubishi	(Mitsubishi ignition system)
Citroen	(Delco ignition system)	Nissan-Datsun	(Hitachi ignition system)
Fiat	(Delco ignition system)	Peugeot	(Bosch ignition system)
Ford	(Delco ignition system)	VW	(Bosch/Fairchild ignition system)
General-Motors	(HEI-ignition system)	Bosch transistorized ignition system for retrofitting 0 227 100 920	

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2. Test instructions

2.1 Rotational speed

Incorrect rotational-speed display can be recognized as follows:

If one starts at the idle speed and slowly increases the engine speed, then the incorrect display can be recognized by an abrupt reduction in the rotational-speed display (e.g. from 2400 min-1 to 1200 min-1).

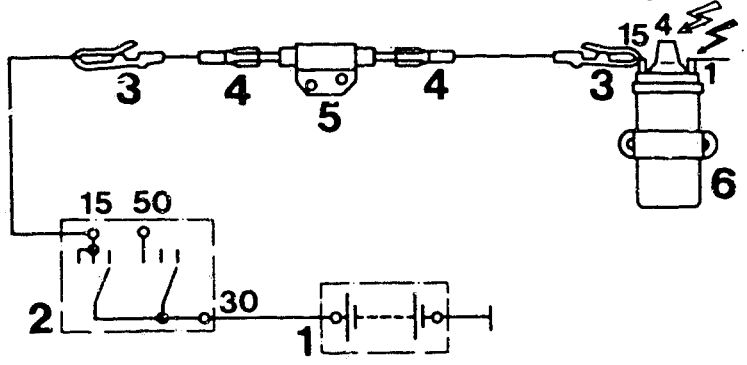
It is, however, possible to attain correct rot.-speed measurements as follows:

Connect a ballast resistor of 0.9 or 1.0 Ohm (see Fig.) in series in the line to term. 15 of the ignition coil (take care not to cause a short circuit). After the rotational-speed measurement, the ballast resistor must be removed (otherwise starting difficulties and misfiring). Connect tester as per operating instructions.

Suggestion for user manufacture

Required parts:

1 ballast resistor 0.9 Ohm	Part No. 0 227 900 002
or	
1 ballast resistor 1.0 Ohm	Part No. 0 227 900 101
2 blade receptacles e.g.	Part No. 1 901 355 881
approx. 0.2 m cable, 1.5 mm² e.g.	Part No. 6 210 150 150
2 insulated clips	Commercially available



1 = Battery
2 = Ignition switch
3 = Clips
4 = Blade receptacle
5 = Ballast resistor
6 = Ignition coil

approx. 400 V

approx. 25 kV

2.2 Dwell angle

The dwell angle is electronically controlled. A measurement of the dwell angle is no longer performed.

2.3 Ignition point

Is displayed correctly. Connect tester as per operating instructions.

After-sales Service

Motor Vehicle Service Information

MOTORTESTER CONVERSION
Incorrect display of rotational speed, dwell angle and ignition point only with trigger boxes 0 227 100 ... (TCI-i, TCI-h) with current limitation

VDT-I-Gen. 032 En
6.80

For additional information see VDT-I-Gen. 030 of 6.80

Re.: Motortester EFAW 268
268 S 10
269
214 B
AE 2000

1. General

Please make sure that the above-mentioned motortesters in your workshop and at your customers (e.g. motor vehicle workshops, oil companies, gas stations, vocational schools etc.) are converted. The conversion is subject to payment and is carried out by the K7 after-sales service of the responsible BG. The standard time is 15 work units (with fitting of switch).

2. Why motortester conversion?

In comparison with conventional ignition systems, transistorized ignition systems with current limitation have different primary voltage characteristics. During the dwell period the voltage at terminal 1 of the ignition coil may assume values from 1.5 V to battery voltage (or greater). This may lead to an incorrect display of rotational speed and dwell angle as well as to incorrect triggering of the meter when testing the ignition system. There is, however, no functional defect in the ignition system, and, for this reason, the trigger box must not be replaced. Since, with the above-listed motortesters, the timing light is triggered by the signal path dwell angle - meter, this incorrect triggering also leads to incorrect flashing and thus to an incorrect display of the advance angle.

3. Conversion measures

The situation is to be remedied by modifying the wiring of the testers so that the timing light is triggered by the clamp-on induction pickup and the pulse shaper stage.

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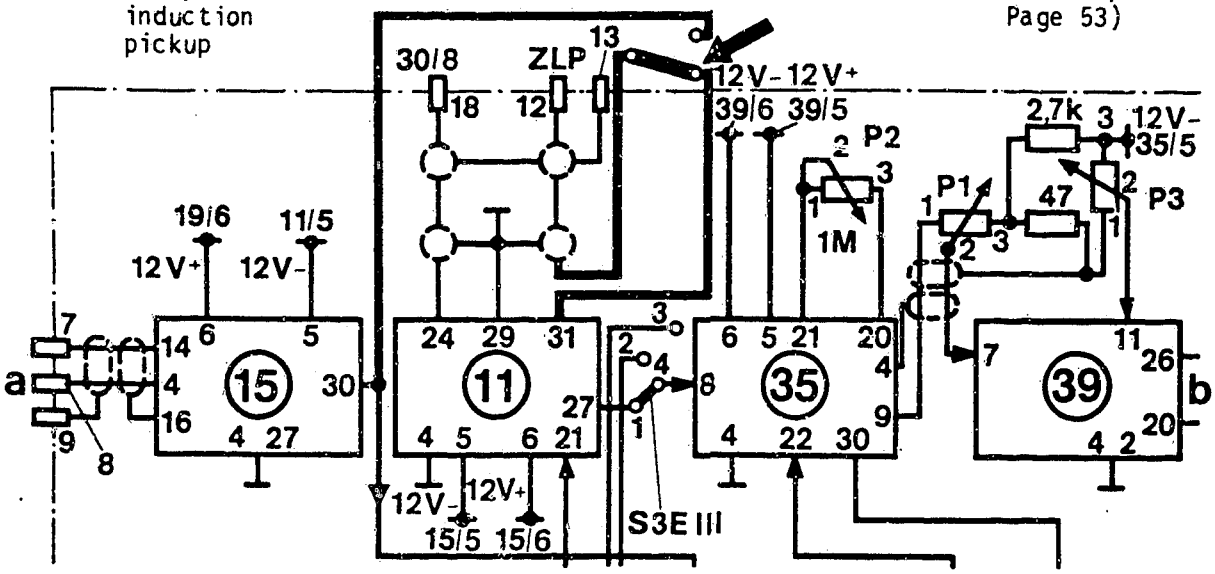
EFAW 268, 268 S 10, 269, AE 2000

Remove the line of the ZLP* from pin 31 of printed board 11 (coupling stage) and connect to pin 30 of printed board 15 (pulse shaper stage) via a switch with change-over contact (e.g. 0 341 500 803). In addition, a new line must be connected from pin 31 of printed board 11 to the other contact of the switch with change-over contact. Arrow points to switch with change-over contact.

* ZLP = timing light

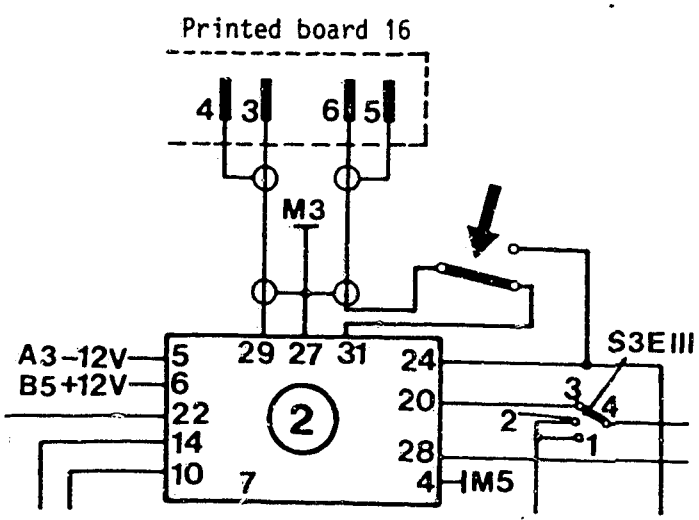
a = Clamp-on induction pickup

b = (Extract from WJF 508/1 Page 53)



EFAW 214 B

Remove the line from terminal 6 of printed board 16 to pin 31 of printed board 2 (coupling stage) and connect to pin 24 of the same printed board via a switch with change-over contact (e.g. 0 341 500 803). In addition, a new line must be connected from pin 31 of printed board 2 to the other contact of the switch with change-over contact. Arrow points to switch with change-over contact.



(Extract from WJF 503/1, Page 64)

By fitting the switch with change-over contact in the front panel of the motor-tester, it is possible to switch over from standard ignition systems to those with current limitation. We recommend that the switch positions be marked correspondingly: e.g. "standard" - "current limitation".
These conversion measures have already been published in the K7 information sheet KJF 28/7911.

4. Test instructions

4.1 Standard ignition systems

Switch position: "standard"
All other tester connections as per operating instructions.

4.2 Ignition systems with current limitation

Switch position: "current limitation"

In order to trigger the timing light, the induction-type pulse generator (clamp-on pickup or red pickup) must always be connected during the measurement.

The selector switch for ignition systems built into the motortester must be switched to standard coil ignition (not to TCI) with these ignition systems.

All other tester connections as per operating instructions.

The dwell angle is electronically controlled. A measurement of the dwell angle is no longer performed.

After-sales Service

Motor Vehicle Service Information

TESTS ON ELECTRONIC IGNITION SYSTEMS
(TCI, TZ)
TESTER INSTRUCTIONS

VDT-I-Gen. 035 En
3.1981

The following tests are listed in older and current Tester operating instructions or in Trouble-shooting with the oscillograph.:

- "Separate ignition coil test" (concerns EFAW 213, 214, 268, AE 2000).
- Calculating the "ignition voltage reserve" (concerns EFAW 213, 214, 268, AE 2000 and MOT series).
- "Intensified insulation test" (concerns EFAW 213, 214, 268, AE 2000 and MOT series).

Nowadays transistorized ignition systems deliver more than 30,000 V secondary voltage.

To avoid damage to ignition coil, ignition cable and ignition distributor by voltage flashovers, the tests listed above should not be carried out on transistorized ignition systems.

The contents of this Service Information has already been published in the K7-Information K7-VJF 17/8012.

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TABLE OF CONTENTS

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